THE IRON AGE

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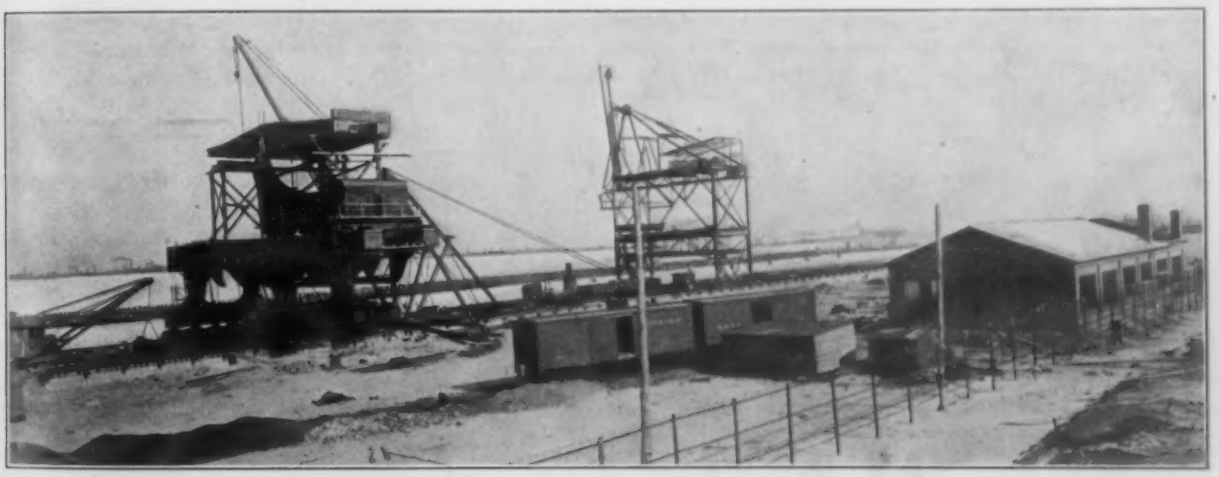
Bethlehem Ore Dock in New York Harbor

Features of the Hulett and Mead-Morrison Unloaders Provided to Serve the Various Classes of Ocean-Going Vessels

Several unusual features have been provided in the new ore unloading dock of the Bethlehem Steel Company at Constable Hook, Bayonne, N. J., which will be ready for the unloading of ore from boats in the latter part of this month. The unloading plant consists of an electric substation, a machine shop, a Hulett automatic unloader of the stiff-leg type, and a Mead-Morrison unloader having a grab bucket operated by the rope system. Two types of ore unloaders were installed because of the differences in boats that will be unloaded. The Hulett machine is especially adapted for unloading modern ore boats with many large hatches, while the Mead-Morrison unloader can operate advantageously in tramp steamers having restricted openings.



Iron Ore Unloading Dock of the Bethlehem Steel Company at Constable Hook. On the left is a Hulett Stiff-Leg Machine and on the right a Mead-Morrison Grab-Bucket Unloader

The machines operate on 62-ft. 10-in. runways extending the entire length of a pier 1060 ft. long. The pier is provided with four railroad tracks under the unloaders. The slip alongside is dredged to a depth of 35 ft. of water at low tide and is connected with the main ship channel to New York harbor by a channel 35 ft. deep, 250 ft. wide at the bottom and 1400 ft. in length.

THE HULETT MACHINE

The Hulett unloader operates a clam-shell bucket of 17 tons capacity. This is rigidly attached to the lower end of a rotating vertical stiff leg carried by a walking beam mounted on a trolley which traverses a runway on the main frame. The main frame is propelled along the pier to line up with the cargo hatches of a ship being unloaded. The bucket discharges its contents into a 50-ton hopper which is located at the slip end of the main frame. This receiving hopper discharges by motor drive into a 30-ton scale hopper mounted on a larry car, which travels on a runway on the main frame so as to register the scale hopper directly above railroad cars on any of the four tracks beneath the machine. This weighing arrangement insures all cars being loaded to their indicated carrying capacity. The operating range of the machine is such that the bucket can extend 66 ft. from the face of the wharf, 44 ft. above and 10 ft. below the water at low tide. All the operations of lowering and hoisting, opening and closing the bucket, rotating the bucket leg, trolley traversing and moving the machine along the dock are under the control of one operator who is located in the bucket leg just above the bucket. In this location the operator travels with the bucket and is thus enabled to have an unobstructed view of it in all positions.

The weighing of the ore and its discharge into cars are under the control of another operator, located on the traveling larry car. The total weight of the Hulett machine is 850 tons and is carried on 48 wheels. The power equipment is as follows:

Hoisting	one 300-hp. motor
Trolley traverse	one 100-hp. motor
Bucket operating	one 100-hp. motor
Bucket rotating	one 30-hp. motor
Receiving hopper	one 100-hp. motor
Larry travel	one 30-hp. motor
Larry hopper	one 30-hp. motor
Propelling gear	one 100-hp. motor

This machine will average one trip per minute, handling 17 tons per trip when working in the

hold of a ship with no obstructions to the free action of the bucket.

The 6000-lb. overbalance of the walking beam is just sufficient to allow the bucket to lower by gravity. This gives a low-power consumption per ton of ore handled, as the walking beam is nearly balanced. The bucket has a long reach for scraping the bottom of a boat in cleaning up, handles large quantities of ore per trip and is very easy of control. This type of unloader is used to a large extent at Great Lakes ports. However, the installation at Constable Hook is the first machine of this type at tidewater. Some modifications were required to adapt this machine to unload ocean-going tramp steamers, as well as modern vessels with open holds, such as are now being built by the Bethlehem Steel Company.

THE MEAD-MORRISON MACHINE

The Mead-Morrison rope system unloader operates a 5-ton rope-suspended clamshell bucket. It employs a hinge type of boom of sufficient length to allow the bucket to reach 60 ft. from the face of the wharf. The overhead clearance is 48 ft. above the water at low tide. The bucket discharges its contents into a 50-ton receiving hopper at the front end of the machine on the main tower. Motor-operated gates on the receiving hopper control the discharge of the ore into a 30-ton scale hopper, mounted on a traveling larry car, which conveys the ore to the railroad cars on any of the four tracks beneath the machine. The operator of the ore bucket is located in a stationary house near the top of the main frame at the wharf side. The rope-system machine weighs about 250 tons and is carried on 40 wheels. The motor equipment is as follows:

Hoisting	300-hp.
Trolley traverse	60-hp.
Propelling gear	60-hp.
Receiving hopper	24-hp.
Larry car travel	12-hp.
Larry hopper	12-hp.

This machine is capable of making two round trips per minute, carrying five tons per trip when the bucket has free access to the cargo. It can use a smaller clam-shell bucket which will reach the cargo in a tramp steamer having stanchions between decks, narrow alleys along shaft tunnels, etc., which would be inaccessible to the Hulett unloader. The clam-shell bucket can be removed and a hook substituted for handling small scoop buckets where it is necessary to shovel the ore by hand.

ELECTRIC SYSTEM AND CONTROL

The electric-control apparatus on the two unloaders was furnished by the Cutler-Hammer Company and the motors by the General Electric Company. The electric power to operate the unloaders is purchased from the Public Service Electric Company of New Jersey, at 2200 volts, 2-phase, 60-cycle, alternating current. The unloaders use direct current at 250 volts, with a complete metallic circuit. A sub-station was installed to transform the alternating current into direct current. All the sub-station apparatus, which was furnished by the General Electric Company, is as follows:

2 rotary converters, each rated at 500 kw., 2 phase, 60-cycle, 600 r.p.m., 250 volts d.c.

4 single-phase transformers (two for each rotary converter), each rated at 270 kva., 2200-180 volts, 60 cycles, oil-insulated, self-cooled.

1 motor generator flywheel balancer of 250 kw. capacity, 250 volts d.c., speed range 550 to 720 r.p.m.

The armature shaft of the machine carries a flywheel consisting of a number of steel plate disks riveted together. This wheel weighs 12,500 lb., and when running at full-rated speed has a peripheral speed of 22,000 ft. per minute. The machine absorbs energy from the source of supply when the power requirements of the unloaders are light, and gives out energy to the unloaders at maximum power-demand periods, by virtue of the energy stored in the flywheel. The maximum demand on the generating station supplying the sub-station is reduced so that a lower power rate can be secured, as the electric power is purchased on a maximum demand basis. One rotary converter and the flywheel set are of ample capacity for operating the unloaders.

An underground conduit system of six 750,000 c.m. lead-covered copper cables connects the sub-station with the contact rails that feed the unloaders. This contact rail system consists of two 85-lb. standard railroad steel rails, one above the other and 750,000 c.m. bare copper cables clamped to the rails for continuous bonds. Porcelain insulators with hook bolts through rail supporting brackets clamp the head of the contact rail, and the contact shoes on the unloaders run on the under side on the base of the rails.

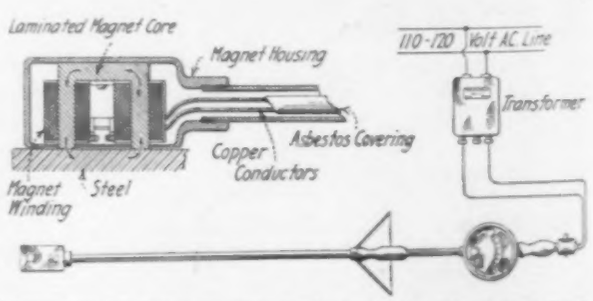
The machine-shop equipment consists of a Putnam 42-in. x 10-ft. engine lathe, a Reed Prentice 16-in. x 4-ft. lathe, a 32-in. shaper, a 5-ft. radial drill, a 31-in. sliding head drill press and a double-ended emery grinder. Each machine tool is equipped with individual motor drive for 2-phase, 250-volt, 60-cycle current, which is supplied by two 15 k.v.a. transformers in the sub-station. The rotary converters will operate only when the unloaders are in operation. The complete lighting is for 250 volts, alternating or direct current. A one-story brick building contains the machine shop, office, storeroom and sub-station.

All the dock equipment is calculated to unload any class of ocean-going vessel with a saving in time and expense. The Lehigh Valley Railroad serves the ore dock and is interested in it.

Indicating Critical Point in Heat Treatment

The Gibb Instrument Company, Inc., Highland Building, Pittsburgh, has put on the market an instrument, known as the Crit-Point, for determining the critical point in the heat treatment of steel. The construction of this new device is clearly shown in the accompanying drawing.

The temperature at which this critical point is reached in each steel is determined in the laboratory by the aid of apparatus, and in practical application the



Advantage Is Taken in This Indicator of the Fact that Steel Loses Its Magnetic Properties when Brought to the Critical Point in Heat Treatment

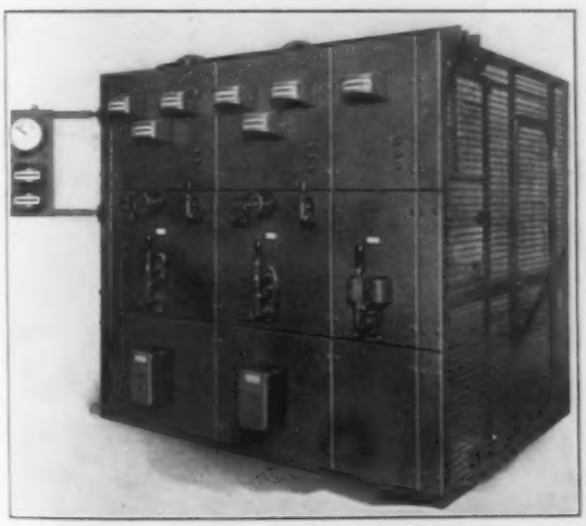
furnace temperature is raised somewhat above this point. The steel is put in and is brought up to what is supposed to be the temperature of its critical point. It is a well-known fact that steel in the process of heating loses its magnetic properties when it is brought to its critical point and the Crit-Point takes advantage of this infallible phenomenon.

Through the medium of magnetic coils, contact is made with the steel in the furnace. A magnetic indicator is placed in the circuit, which is connected through a small step-down transformer with a source of alternating current and immediately indicates whether or not the steel has reached its critical point. The surface of the steel in time becomes non-magnetic, or, in other words, is brought up to the critical point. This is indicated on the meter by an approach of the needle toward the red line indicative of the critical point. As the heat penetrates the steel, and the interior is brought to the critical temperature, the needle on the indicator continues to approach the critical-point mark. The Crit-Point, it is pointed out, does not measure temperature. When the critical point is indicated on the meter, no indication is given of what the temperature might be. The knowledge of this temperature is irrelevant; the steel is at or above the critical point.

A Switchboard of the Dead Front Type

The switchboard department of the General Electric Company, Schenectady, N. Y., has developed a type of switchboard for general power and lighting service up to 3500 volts in which live parts are inaccessible from the front of the board. The live parts of the current and potential receptacles are recessed to make accidental contact with them difficult. Further protection is afforded by grille work screens having hinged doors and spring locks. In this way it is impossible for any one other than an authorized person holding the key to enter the space at the rear of the switchboard.

Disconnecting switches are employed between all oil circuit breakers and busbars and provide for the convenient and rapid isolation of the breakers from the buses for inspection, changing oil or repairs without danger. The board is equipped with calibrating receptacles on the front of the panel instead of the usual calibrating switches at the rear, an arrangement which,



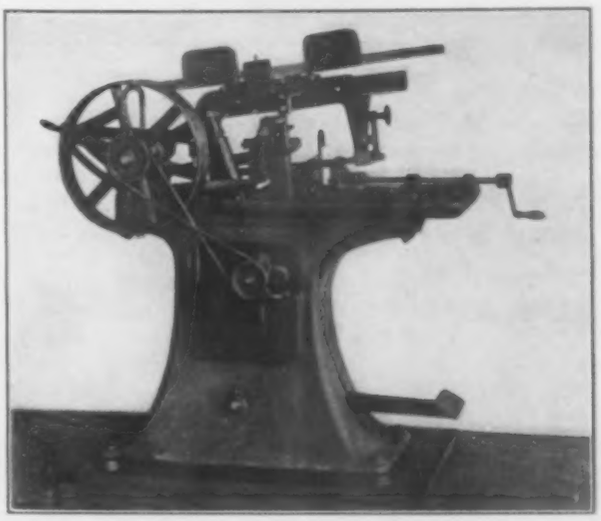
All Live Parts Are Inaccessible from the Front of This Alternating-Current Switchboard Except the Current and Potential Receptacles Which Have Their Live Parts Recessed to Make Accidental Contact Difficult

it is pointed out, permits safe and convenient calibration of instruments and meters from the front, the insertion of plugs in the calibrating receptacles connecting the testing instruments in series with the one undergoing test. Removable fuse receptacles of the screw plug type are provided and enable the secondary potential transformer fuses to be replaced from the front of the switchboard without danger of contact with live parts.

The third annual safety exhibition of the Ohio Industrial Commission will be held at Columbus, Ohio, March 5 to 10. Arrangements for the exhibits will be made at an early date, and Memorial Hall has been selected as headquarters. Manufacturers may obtain further information from J. Y. Bassell, Columbus Chamber of Commerce.

Hack Saw Machine with a Treadle

The L. S. Starrett Company, Athol, Mass., has put a hack-saw machine on the market. Aside from the fact that the machine represents a new line for the company, it is of interest in that it has a treadle for raising the saw frame, an oil dashpot control for



A Treadle Arrangement Is Employed to Raise the Saw Frame in This Hack Saw Machine Instead of Requiring the Operator to Lift It

the descent of the blade, a stroke adjustment and a frame-locking device.

The saw frame is mounted on a rectangular slide with a bearing 11¼ in. long. An adjustment for wear is provided as well as a quick-acting tightening device to hold the blade at right angles with the work being cut. The stroke of the saw is adjustable for stock ranging from 1 to 6 in. in diameter, and it is possible to use practically the entire length of the blade, which, it is emphasized, insures uniform wear and faster cutting.

The descent of the saw to the work when the machine is started is controlled by an oil dashpot. This arrangement, it is explained, makes it possible to start the machine with the frame up and is relied upon to prevent the latter from dropping and breaking the saw. The blade is also gradually lowered to the work with the result, it is pointed out, that the teeth do not bite in rapidly and become stripped or the saw broken. The treadle at the right of the base is employed for raising the saw frame. In this way the weight of the operator brings the saw up instead of requiring an expenditure of his strength in lifting, a feature which tends toward greater speed. The saw is prevented from dragging on the return stroke by an automatic locking device, which also keeps the frame at any height when the machine is stopped for setting the work.

A tank for cutting compound and a pump are located in the interior of the base. If desired, they can be removed readily for cleaning, although it is explained that this is seldom required, since the chips are retained in the pan of the bed and are easily taken away. While the machine is intended to take the builder's standard 14-in. blade, 12 or 13 in. blades can also be used. The over-all height is 48 in. and the distance from the floor to the top of the table is 28 in. The floor space occupied measures 14 x 32 in.

Another Stainless Steel

Harry Brearly, Sheffield, England, has patented in this country (U. S. 1,197,256) a non-tarnishable alloy containing 9 to 16 per cent of chromium and less than 0.70 per cent carbon. A typical composition has 0.30 per cent carbon, 0.30 per cent manganese and 13 per cent chromium. Small amounts up to 1 or 2 per cent of nickel, copper, cobalt, tungsten, molybdenum and vanadium are said to be without effect on the untarnishable properties.

The Power-Forging of Chain Cables*

How the Substitution of Power for Hand Welding Produced Better Chain and Worked an Economic Revolution in the Industry

BY FREDERIC G. COBURN†

There has been developed, during the last two years, at the Boston Navy Yard, a power-forging process for the manufacture of chain cables. Chain cables up to 2¾ in. diameter were manufactured by hand without any serious mechanical difficulties. Three-inch cables, however, presented difficulties due to the size of the metal and the hard labor required of the chain makers' helpers.

The Panama Canal Commission required 3-in. guard chains for the Panama Canal and called for an ultimate breaking stress of 525,000 lb. for stud-link chain and desired the same strength for 3-in. open-link chain. It was found necessary subsequently to reduce the requirement to 500,000 lb. and later to 450,000 lb. Private chain makers were unable to make the chain as good as that manufactured at the navy yard. Illustrations Figs. 1 to 4 show test triplets submitted to the Panama Canal Commission by the private manufacturers. It will be noted that the hand-welded links are irregular in shape or reduced in diameter adjoining the weld, and are obviously inferior to the power-welded links.

The inferiority of hand-made welds is due to the fact that the helpers cannot hit hard enough with their sledges to drive the scarfs together. The welding surfaces are not smooth since they are made by peening, forming pockets which retain slag which is not worked out by the hammering. Fractures in old chains show that not over 10 per cent of the surface was welded. The strength of the chain was due to its form, assisted by the tacking together of the scarfs. In the large chains it is impossible to finish the inside of the link at the welded end, thus leaving a hole and reducing the sectional area. Another serious defect in hand-welded chain is the wasting of material in the fire just back of the weld.

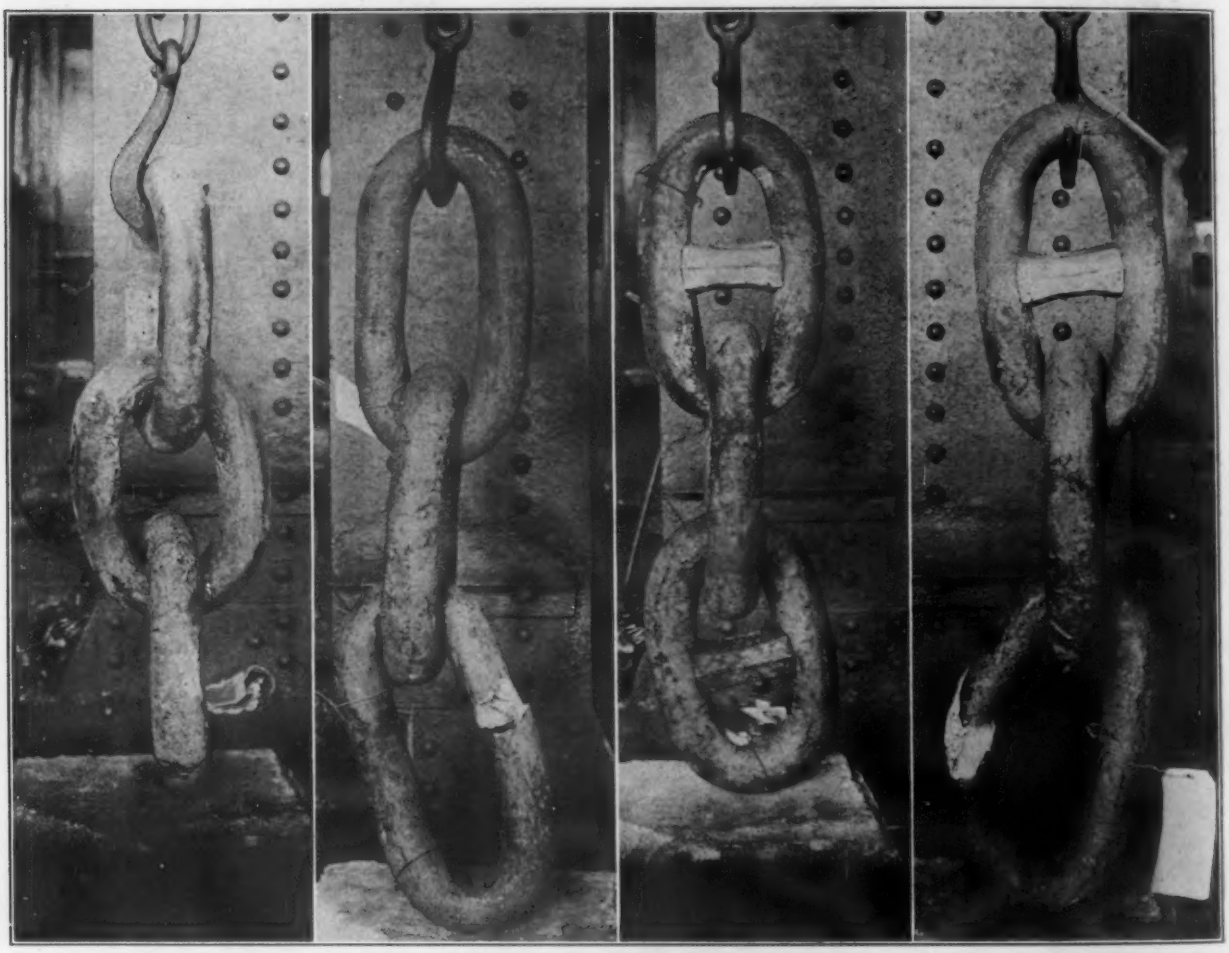


Fig. 1—Hand Welded Triplet No. 2, Open Link Chain. Note irregular shape of middle link. Fig. 2—Hand Welded Triplet No. 2, Open Link Chain, After Test to Destruction. Note lifeless appearance. Broke at 364,000 lb. 525,000 lb. required. Fig. 3—Hand Welded Triplet No. 1, Stud Link Chain. Rough and irregular. Fig. 4—Hand Welded Triplet No. 1, Stud Link Chain. Tested to Destruction. Broke at 390,000 lb. 525,000 lb. required

The power-welded process as experimentally developed consists briefly of shearing the bar to length in a power shear; bending up the end in a 6-in. Ajax upsetting machine; forming the scarf under a 2500-lb. steam hammer; bending the link by hand around a mandrel; welding the link under 350-lb. single frame steam forging hammer, finishing the link under dies fitted to 3000-lb. double frame forging

*Abstract of a paper read at the twenty-fourth general meeting of the Society of Naval Architects and Marine Engineers, New York, Nov. 16, 1916.

†Naval constructor, United States Navy.

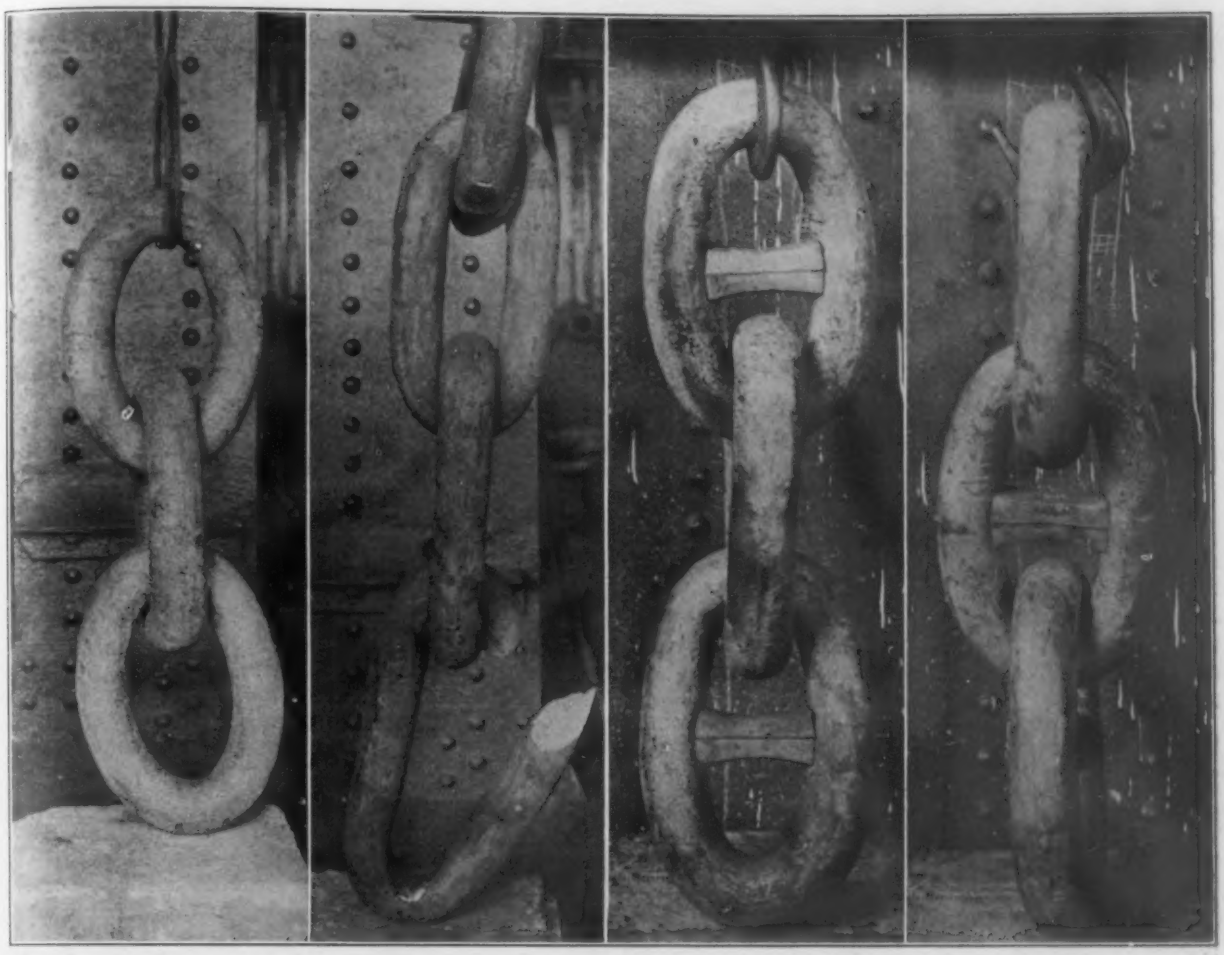


Fig. 5—Power Welded Triplet No. 3, Open Link Chain. Smooth forge, regular in shape. Fig. 6—Power Welded Triplet No. 3, Open Link Chain. Tested to destruction. Looks tough and well put together. Broke at 532,000 lb. 525,000 lb. required. It exceeded the requirement for stud link chain. Figs. 7 and 8—3¼-In. Test Triplets. This chain weighs 595 lb. per fathom, and runs 6 links per fathom. Ultimate strength 612,000 lb. For battleships of the Pennsylvania class

hammer; trimming off the "flash" by hand. The chain made by this process looked well, but would not meet the breaking stress requirements. This fault was remedied by heat treatment.

It had been suggested that the chain be quenched from a temperature above the critical point and vibrated, if possible, with a view to stiffening and strengthening it. The opposite treatment, however, namely, an air quench from a temperature slightly above the upper critical point was found to be the one needed. The reason for this is that that severe hammer blow on the link by the steam hammer stiffens it in the welded quarter and partial annealing is required to soften it enough to make the quarters deform under the shearing stress which obtains there. This permits the total stress to run up until the fracture can be obtained by a combination of shear and tension. The power welding and heat treatment process permitted the manufacture of open-link 3-in. chain which would stand a stress

Fig. 9—Upsetting the Bolt

Fig. 10—Scarfing the Bolt

Fig. 11—Bending the Bolt. Ready to bend

Fig. 12—Bending the Bolt. Prying scarfs apart

as high as 550,000 to 560,000 lb. The work done up to this point was of an experimental nature, and on July 31, 1914, authority was given by the Navy Department to proceed with the chain making on a manufacturing basis by means of the power-forging process.

During the fiscal year ending June 30, 1916,

Fig. 13—Threading the Preheated Link

the Boston Navy Yard manufactured about 9 miles of chain ranging in diameter from 2½ to 3⅜ in. inclusive. The cost of the 3¼-in. chain was practically $6.00 per foot or 6 cents per pound, which cost is still considered high because it will be possible to effect further improvements in the manufacturing process. The relative rate of speed of the hand-welding and power-welding process is as follows: The production of 3¼-in. cables by hand-welding was three links in two days per gang, at which rate a single gang would require seven years to make the cables for a battleship of the Pennsylvania class. The production at the present by means of power welding is at the rate of 20 links per gang per day.

In the manufacturing process, the bar iron, after being sheared into lengths or bolts, is transported in baskets, a ton or more at a time, to the upsetting and scarfing machine. Each scarfing unit consists of a special furnace, an upsetting machine and a drop hammer arranged practically in the arc of a circle. The furnace is charged with from 6 to 12 bolts, depending upon the diameter. Each bolt is heated for a length of about one foot and is then upset in the machine, as shown in Fig. 9. In the same heat the bolt goes directly from the upsetting machine to the 2500-lb. hammer, where it is scarfed, as shown in Fig. 10. The flash from the drop forging is removed and the process is repeated to scarf the opposite end of the bolt.

From the scarfing operation, the bolts go to the link-bending plant, consisting of a hydraulic forging press of capacities of 40, 60 and 100 tons respectively. Ordinarily only the 40-ton cylinder is used and the process of bending the link is illustrated in Figs. 11 and 12. The mechanism for bending the link is mounted on a sole piece bolted to the body of the press. It consists of a stationary mandrel of the size and shape of the inside of the link. The bolt is clamped into the press with one of the scarfed ends fitting snugly one end of the mandrel. When the press comes forward the small wheel, shown in Fig. 12 as touching the link, wipes

Fig. 14—First Welding Operation on Dolly Dies

the bolt around the mandrel, leaving it in the position shown in the illustration. The small wheel is carried on an arbor attached to a toothed wheel revolving about the geometrical center of the mandrel. The wheel is rotated by a sector which rotates about an arbor fixed to the sole piece of the mechanism. It is pushed and pulled by a link secured to its end and to the head of the press. As soon as the chain link has been wiped around the mandrel, the scarfs are pried apart with a crow bar.

The welding plant consists of two hammers, a 3000-lb. double-frame steam forging hammer, and a 350-lb. single-frame steam forging hammer, both operated by compressed air. The 3000-lb. hammer is fitted with dies, similar to drop-forging dies, in which there is an impression of the shape of the link. This impression is not the final shape of the completed link, but is such that when the link is hammer, it is not in perfect shape. It is, therefore, re-heated and when at welding heat is struck several blows by the dies in the 3000-lb. hammer, thus forming the link perfectly and completing the welding.

The plant illustrated is one in which the process was developed but new plants will consist of one double-frame 1800-lb. steam drop hammer, on either side of which will be installed a 250-lb. single-frame forging hammer, one being left-handed and the other right-handed. This arrangement permits two gangs to work on opposite sides of the large hammer, each having its own crane, fire and small hammer, and dividing the cost of the large hammer between them.

All experimental work was done with cast-iron dies. Early dies were made by "rule-of-thumb" and a process of trial and error, which, however, gradu-

Fig. 15—Second Welding Operation

stretched to proof stress, it will take the shape specified on the standard plan.

Immediately after the link has been completed in the chain, a new link is threaded through it, being brought from a preheating furnace. The chain being made is carried on a low jib crane with a trough running from the end of the jib to a point about 4 ft. from the ground. The new link having been threaded in, the chain is swung over to the large hammer and closed down in the dies. The link is then heated for the first welding heat in an oil forge of the ordinary type, excepting that it has an unusually large area of flame duct and combustion chamber.

The division of labor in welding is: One man to operate the hammers, one to operate the hoist and swing the crane, a mechanic and his helper to grab the link with a special pair of tongs, and a fifth member of the gang, who tends the fire, helps with the chain under the hammer, swings the crane and assists in setting the stud.

The scarf is thoroughly hammered under the 350-lb. hammer, which is fitted with special dies with horns in the form known as "dolly dies," and the slag worked out from between the welding surfaces. This is the most important part of the welding process. While the link is welded in the 350-lb. ally developed into an engineering problem. Steel dies were next put in service and experiments made with cut and cast-steel dies, in which the latter proved to be superior, being cheaper and lasting fully as well. At the writing of this paper a pair of cast-steel dies have been in service 24 hours per day for almost every working day during a period of eleven months. They are still in good condition.

It is interesting to note the economic significance of this power-forging process of making chain, as it is an excellent illustration of the division of labor which always results in the application of power for operation. Where one gang performed the operations of scarfing, bending, welding, finishing, etc., it was impossible to substitute a machine for the gang. But when the process was divided into its integral parts, then it was found that each little part was a simple one, to be done over and over again, and lending itself to the application of power. It has also this significance—that where the hand-welding process required a high-grade mechanic on each operation, the power process required a high-grade mechanic on only one operation —that of welding. The other operations are so simple that a helper can be used, the helper being carefully taught the particular part of the process that he will have to perform.

Sulphide and Oxide Inclusions in Steel*

A New Metallographic Method for Distinguishing Them—Light Gray Spots Not Always Sulphides – Some Practical Examples

BY GEORGE F. COMSTOCK

IT seems a common opinion among metallographists that all light-gray inclusions seen with the microscope in polished sections of steel are manganese sulphide. Examples of this belief are continually appearing, as for instance in the paper by Dr. Henry Fay on manganese sulphide as a source of danger in steel rails,† and in Lieutenant-Commander Cook's paper on "The Metallography of Steel for U. S. Naval Ordnance."‡

Slate-colored inclusions are considered to be silicates, and dove-gray inclusions, manganese sulphide. To show the danger in the latter unqualified assumption, it should be sufficient to examine the edge of any piece of steel that is covered with a fairly thick scale, and that has been polished in such a way as to prevent the scale from breaking away entirely below the polished surface. This can be done by protecting the scaled edge of the specimen with some soft metal, or fusible metal applied molten, or ordinary red fiber such as electricians use for insulating. An examination of this scale, if the polishing has been done well, and the sample is preferably unetched, will show it to be light gray, and apparently "manganese sulphide." We know, however, that scale is chiefly iron oxide, and contains sulphur only as an impurity. Its similarity in appearance to manganese sulphide is shown in Fig. 1, which is a transverse view of the edge of a small hot-rolled steel rod, magnified 200 diameters. The steel has been etched with picric acid, but the gray scale can be plainly seen at the edge of the metal. The very dark material beyond the scale is the red fiber in which this specimen was clamped to prevent the scale from falling away during polishing.

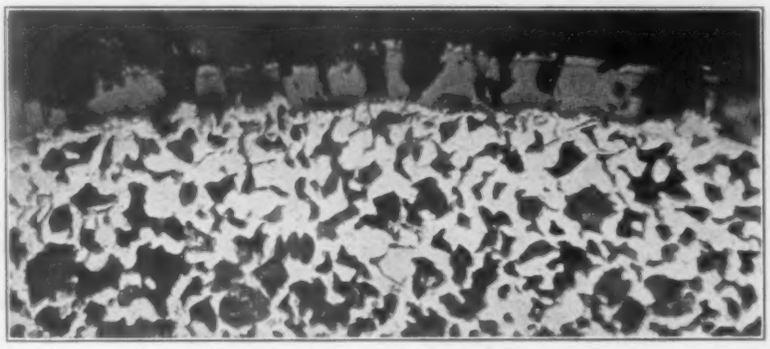
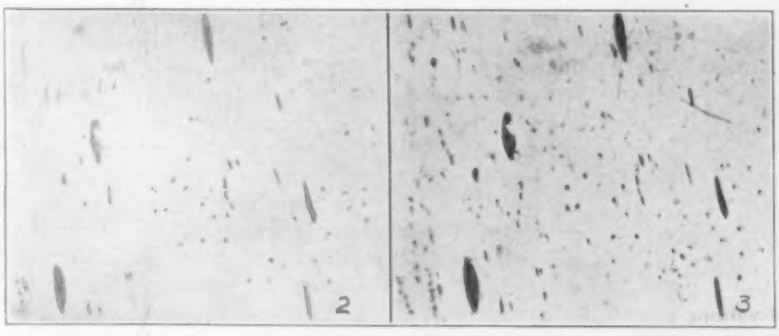


Fig. 1—Transverse View of the Edge of a Small Hot-Rolled Steel Rod, Etched with Picric Acid, Magnified 200 Diameters

In the course of several years' work with the microscope on rail steel and other commercial steels the writer has not infrequently seen light-gray inclusions that, from evidence given by sulphur prints, or for other reasons, did not seem likely to be sulphides, and in some cases these were known without any doubt to be oxides, like the scale above mentioned. Finally, a case of some importance arose, where it was desired to know definitely whether certain light-gray inclusions were sulphides or not, and it was not possible to decide the question from their color alone.

Reference to the standard textbooks on metallography did not help much, for the only real test described for distinguishing oxides from sulphides involved heating the polished sample in a current of carefully purified hydrogen, and this method was considered as too complicated and necessitating too much preparation and practice. Etching with weak organic acids was not found satisfactory, and neither was the method of using a drop of sulphuric acid and watching for bubbles of hydrogen sulphide gas. Tried with known sulphide inclusions, both these methods attacked the steel itself too strongly, or else, if the acids were weakened, had no effect either on steel or sulphides. It was finally decided to get together a few specimens containing sulphides, and others in which oxides were known to be present, and to try various solutions on them until one was found that would attack one type of inclusion and not the other.

This work had not progressed very far when it was remembered that boiling alkaline sodium picrate, which is used to darken cementite, having no effect on ferrite and very little on pearlite, was always found to attack the sulphide inclusions in a sample, leaving black pits instead of the light-gray spots seen before etching. Fig. 2, for instance, shows some sulphide inclusions in a polished section, unetched, cut from a segregated streak in a steel rail, where sulphur prints indicated the presence of high sulphur. This same spot etched with boiling alkaline sodium picrate is shown in Fig. 3, where the sulphides are seen to have been blackened by this reagent. The darkening seems to be due to an actual



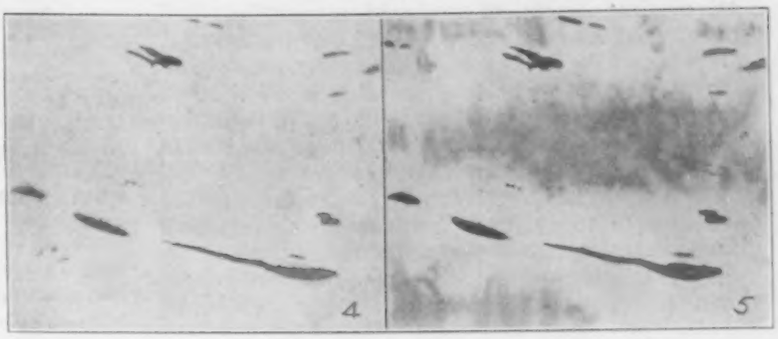
Sulphide Inclusions in a Polished Section Cut from a Segregated Streak in a Steel Rails. Magnified 130 Diameters. Fig. 2 is unetched and Fig. 3 has been etched with a boiling alkaline sodium picrate

*From a paper to be presented at the meeting of the American Institute of Mining Engineers in New York in February, 1917. The author is metallographist, physical testing laboratory, Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

†A Microscopic Investigation of Broken Steel Rails: Manganese Sulphide as a Source of Danger. *Proceedings* of the American Society for Testing Materials, Vol. 8, p. 74 (1908).

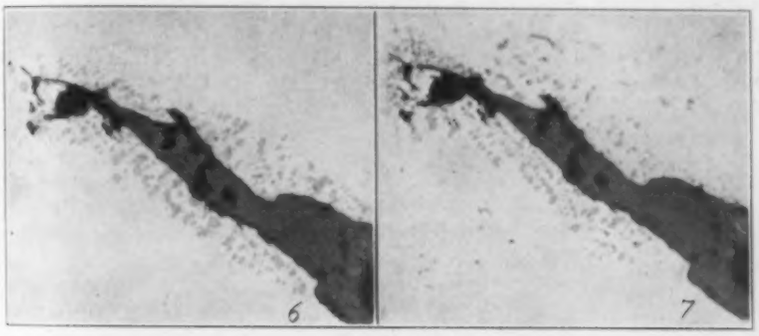
‡*Transactions* American Institute of Mining Engineers, Vol. 53, p. 238 (1915).

solution of the manganese sulphide in the etching liquid, so that instead of a smooth polished surface, we now have a surface full of pits or hollows, where the sulphides were, and as these hollows do not reflect any light back into the microscope with vertical illumination, they appear black in the field of view. Figs. 4 and 5 show some other sulphide inclusions in a shell-steel billet, before and after etching, respectively. In this lower-carbon steel the ferrite-pearlite structure is brought out faintly by the etching, but not enough to interfere with the distinct blackening of the sulphides.



Sulphur Inclusions in a Shell Steel Billet, Magnified 130 Diameters. Fig. 4 is unetched and Fig. 5 has been etched the same as Fig. 3

When this etching with boiling alkaline sodium picrate was tried on steel known to contain oxides, the problem of distinguishing oxides from sulphides was solved at once, for the oxide inclusions were found to be absolutely unattacked. Fig. 6 shows a cross-section, unetched, of a seam in the base of a steel rail. These surface seams are always filled with scale, or oxide, although the light-gray color has sometimes led observers to believe that manganese sulphide was present. The fact that such seams give light streaks instead of black spots on sulphur prints and etched sections, however, shows that oxide and not sulphide is really present in them. This seam, etched with boiling alkaline sodium picrate, is shown in Fig. 7. The oxide is seen to be entirely unattacked.



Cross-section of a Seam in the Base of a Steel Rail, Magnified 130 Diameters. Fig. 6 is unetched, and Fig. 7 has been etched as in the foregoing cases

The application of this solution to etching all grades of steel for distinguishing between oxides and sulphides has not been described before, so far as the writer is aware. In ease of application and certainty of results it is much superior to other methods that have been suggested for this purpose. One advantage is that the solution used is one that every metallographist should have on hand for etching cementite in high-carbon steel.

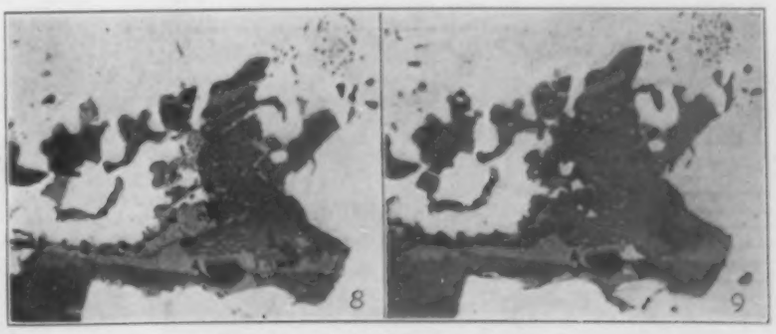
This same solution can be made to serve two purposes. It was first discovered by Kourbatoff, who recommended it for darkening cementite because it does not attack ferrite or pearlite. The writer makes up the solution according to the formula given in Sauveur's *Metallography and Heat Treatment of Iron and Steel*, the procedure being about as follows:

25 gr. NaOH are dissolved in 60 to 70 c.c. of water, 2 gr. picric acid are added, and the solution is heated until the picric acid is dissolved, when the volume is brought up to 100 c.c. by adding more water.

In using this solution to etch polished-steel specimens, it is brought to boiling in a beaker on a hot plate, the specimen is immersed in the solution, and boiling is continued for 10 min. Then the specimen is removed, washed, and dried. The polished and etched surface may be wiped dry with chamois skin without affecting the results. If the specimen contains cracks, this wiping is necessary, and repeated washing and drying may also be necessary, to remove the last traces of the sodium picrate from the surface to be examined. The solution may be used many times, but as the boiling makes it more concentrated water should be added occasionally to keep the volume about 100 c.c.

Some illustrations of the practical use of this method for distinguishing oxides from sulphides follow. A section of a steel casting, which cracked while hot and in which the presence of oxides might therefore be expected, was polished. An experienced eye could perhaps tell which of the inclusions were sulphides and which were oxides, but the distinction at best would not be convincing. After etching by the method described above, however, the difference between the two kinds of inclusions became evident. The arrangement of these sulphides was noteworthy, as a network was strongly suggested. By this method of etching it can easily be shown that the small inclusions often found in a network arrangement in the ferrite of well-deoxidized steel castings are merely finely divided sulphides. An instance of such inclusions was described by Dr. Henry Fay in a paper on "Some Causes of Failures in Metals," *Proceedings* of the American Society for Testing Materials, Vol. 11, p. 439 (1911), and well illustrated by his Figs. 16 and 17 on page 450. These are said to be "slag" by Dr. Fay, but their appearance is exactly similar to numerous occurrences of sulphides which have come to the writer's attention.

A large complex slag inclusion, also in a cracked

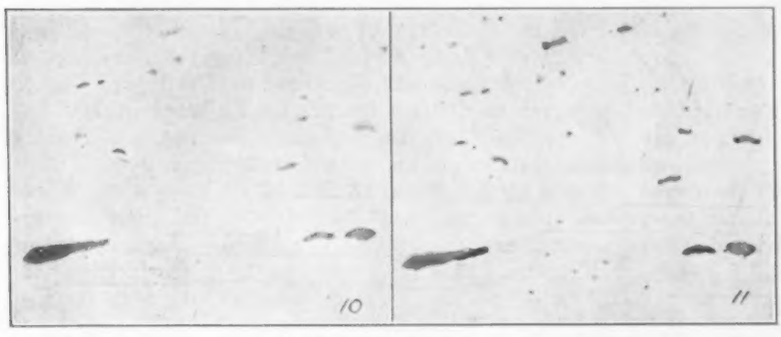


Cracked Steel Casting Showing Large Complex Slag Inclusions, Magnified 130 Diameters. Fig. 8 is unetched, and Fig. 9 is etched as in the preceding photomicrographs

steel casting, is shown unetched in Fig. 8. The light-colored rough-looking part of this inclusion at the center of the field of view was bright yellow, and hence considered to be sulphide of iron. The other light-gray portions, including the spots in the dark-gray part, were supposed at first to be manganese sulphide, and the darker part, manganese silicate. But when etched with boiling alkaline sodium picrate, only the yellow constituent was attacked, showing that it alone was sulphide, and the light-gray constituent was oxide instead of manganese sulphide. The appearance after etching is shown in Fig. 9.

A section cut from a bar of ingot iron that was red-short and cracked in rolling is shown in Fig. 10, taken before etching. Most of the inclusions found here were light gray in color, but many of them had yellow parts attached to them at one or both ends. The yellow substance, which is very rarely seen in steel, was taken to be sulphide of iron, and the gray inclusions were at first supposed to be manganese sulphide. But the manganese content of this ingot iron was found to be very low, and the sulphur also was not high enough to allow the presence of so many sulphides. Consequently, it was doubtful whether these gray inclusions were sulphides or oxides, until the sample was etched with the boiling alkaline sodium picrate solution, when it was apparent at once that they were oxides, and only the yellow substance was sulphide. The inclusions of Fig. 10 are shown after etching in Fig. 11, where the distinction between oxide and sulphide is very plain. One of the largest particles of the yellow constituent was noticed, before etching, to have a spotted appearance, and when examined under high magnification it was seen to be full of very fine gray spots. This is evidently a eutectic of iron oxide and iron sulphide. Under the microscope, the large unspotted dark-gray areas, with the black pits due to fracture in polishing, were oxide, and the spotted area the eutectic. The oxide is darker than the sulphide. After a short etching with boiling alkaline sodium picrate the eutectic, but not the oxide, was attacked, for the former was now darker than the latter, and its structure blurred and indistinct.

These notes are presented in the hope that the simple method here described will appeal to metallographists in general as being worthy of trial in cases where the identity of light-gray inclusions in steel is in question, so that in future sulphides need not be called slag; and the error of calling oxide or scale inclusions manganese sulphide merely because their color is light gray may also be avoided.



Section Cut from a Bar of Ingot Iron That Was Red-Short and Cracked in Rolling. Magnified 130 Diameters. Fig. 10 is unetched, and Fig. 11 etched with a boiling alkaline sodium picrate

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The greatest possible economy in the use of high-speed tool steel is recommended by the local munition authorities in Germany by means of the display of an official notice in factories and workshops.

Screw Punch and Die Testing Press

A screw press designed to aid toolmakers in the production of accurately fitting punches and dies has been developed by the Manhattan Machine & Tool Works, Grand Rapids, Mich. An effort has been made to provide sufficient space for mounting the die in any desired position, as well as providing ample room between the bed and the ram. Another point, upon which emphasis is laid, is the convenience of handling, it being a one-man machine, in which the toolmaker does not require any help.

The Die Being Tested Is Clamped on the Bed of the Press and the Punch Is Forced Down by the Hand-wheel

The press consists of a bed measuring 18 x 36 in. and having a clear space of 26 in. between the standards. The top of the bed has 52 holes, ⅝ in. in diameter, tapped in the upper surface to enable the die to be mounted in any desired position. The handwheel for operating the punch shank is 24 in. in diameter and is mounted between the standards.

A maximum clear space of 24 in. is provided between the bed and the ram, thus, it is explained, enabling the die to be blocked up on parallels and providing clearance for springs, cams, etc., as well as permitting the action of the punch in the die, the timing, etc., to be inspected. Another advantage claimed is that the punch can be lined up with the die and then raised high enough to enable the pressure pads, stripper plates, springs, etc., to be mounted without removing the punch from the press.

One Day of Rest in Seven Discussion

Working hours in continuous industries is one of the topics to be discussed at the annual meeting of the American Association for Labor Legislation, and William B. Dickson, second vice-president and treasurer of the Midvale Steel & Ordnance Company, is to lead the discussion on "Practical Aspect of the Weekly Day of Rest and the Eight-Hour Shift in Continuous Industries." This particular session will be held on Friday morning, Dec. 29, at Ohio State University, Columbus, Ohio. Another one of the sub-divisions of the topic announced is: "One Day of Rest in Seven by State and Federal Legislation," discussions to be led by John A. Fitch, editor, industrial department of the *Survey;* and another, "Eight-Hour Shifts by Federal Legislation," led by Prof. John R. Commons, University of Wisconsin.

After-the-European-War problems are to be discussed at the banquet of the association, Friday evening, and at a luncheon meeting, Saturday, Dec. 30, at the Hotel Sinton, Cincinnati, health insurance is to be the topic.

The testing of two series of steel columns of the American Railway Engineering Association and the American Society of Civil Engineers by the United States Bureau of Standards has been temporarily interrupted, with the object of studying the data already obtained and making further supplementary tests on specimens cut from the columns. A paper on the strength of steel columns in tests has been completed and it will be published as a technological paper by the bureau.

Management and Engineering Meetings

Measuring the Manager; Humanizing the Plant; Evaluating the Business; and Studying the Machine Shop Discussed in New York

THE inefficiency of the manager; more about the human factor in industries; the need of a means for collating machine-shop information for the common good, and the undeveloped but necessary place of the mechanical engineer in industrial preparedness were conspicuous topics in the discussions of the meetings held last week in New York of the American Society of Mechanical Engineers and on Saturday of the Taylor Society, the society organized some years ago to promote the science of management, and renamed last year.

As usual, the meetings on mechanical engineering subjects were numerous with simultaneous sessions on different days. The Taylor Society meeting, following the meeting of the mechanical engineers and attended by some members of that organization, found itself like the mechanical engineers, for example, emphasizing a need to open the manager's eyes to his own inefficiency, and also dwelt at length on the human factor. In this respect the management meetings were noteworthy for the relatively small consideration given to the mechanism of management, which has formerly received most of the attention, discussing instead the worker from the standpoint of human relations.

The subjoined account covers these various topics and also some of the information developed on gas-power subjects, and on the heat treatment of chains.

Machine-Shop Practice Data to Be Compiled

At the session of Wednesday afternoon, Dec. 6, of the American Society of Mechanical Engineers, held under the auspices of the sub-committee on machine-shop practice, two papers were presented. The first of these, by Carl G. Barth, consulting engineer, Philadelphia, was on "Standardization of Machine Tools" and contained suggestions regarding standards of speed and feed series and standardized power for machine tools, etc. It dealt with the subject of standardization of the machine equipment of a shop as a whole, standard speed and feed series, the power of machine tools, toolposts for lathes, lathe centers, T-slots and milling and vertical drilling machine sockets.

Universal Speed and Feed Series

The author strongly urges the adoption of a universal speed series by all machine-tool builders for all machines such as lathes, boring mills, milling and vertical drilling machines, etc., with the available speeds in geometric progression. The same procedure is recommended for feeds except for lathes where the feeds for plain turning are obtained as a constant fraction of those employed in screw cutting. The adoption of a standardized amount of power for each size of machine of a certain type is recommended as enabling the greatest advantage to be derived from the adoption of a standard speed series. Both, however, must be adopted if the fullest advantages are to be realized. The form of toolpost recommended for lathes is that which has been in use for some time. The universal adoption of Brown & Sharpe standards for lathe centers and sockets for milling and vertical drilling machines is recommended, as well as the universal abandonment of the tang as a method of driving drills, a key drive being employed. It is planned to review the paper at some length in an early issue.

Codifying Machine-Shop Practice

The other paper, "A Proposed Plan for the Activities of the Machine-Shop Practice Sub-Committee," by H. K. Hathaway, consulting engineer and vice-president Tabor Mfg. Company, Philadelphia, advocated a plan leading to the more rapid and positive development of machine-shop practice as a science and to make available and readily accessible to all engaged in that practice the knowledge now existing in scattered and unrecorded form as well as that which might be added as the science advances. He recommended the grouping and codification of the data in accordance with a logical scheme of classification and indexing which would bring together in the most accessible and usable form everything pertaining to each of the divisions and subdivisions of the science, and the working out of a definite plan of action for procuring from members best qualified papers dealing with each subject covered by the classification, with the result that the papers when properly arranged would constitute a classified reference library. Another and even larger undertaking recommended was the prosecution along predetermined lines of research that would result in definite advancement of the art, such work at present being almost entirely left to the enterprise of individuals or companies, with the result that there is no co-ordination of effort. The first part of the plan in the author's opinion might be undertaken at once and a classification of machine-shop practice arranged to permit of easy expansion and correction was appended to the paper.

HOW PROPOSED WORK SHOULD BE DONE

This paper produced considerable discussion. In a written discussion submitted by Henry Hess, Philadelphia, general supervision by the research committee of the society of the work of the sub-committees engaged in the researches outlined by the paper was suggested, as well as co-operation with other technical societies.

Robert C. H. Heck, professor of mechanical engineering, Rutgers College, New Brunswick, N. J., asked for data on average practice on speeds and feeds in machine shops.

R. J. S. Piggott, power engineer, Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn., agreed with the author as to the desirability of having data available. He mentioned conditions in a munitions shop where thirty-one cutting compounds formerly used had been reduced to seven. He stated that the work should be done earnestly or not at all, and blamed the attitude of secrecy on the part of manufacturers as being at the bottom of American inefficiency. With reference to the classification system proposed by the author he took exception to the statement that the Dewey decimal system would not serve, and stated that the latter could be expanded as needed.

F. L. Eberhardt, Gould & Eberhardt, Newark, N. J., commended the paper as giving a plan for collecting interesting data, but suggested that a time limit of one year should be fixed in analyzing results given in the trade and technical journals, etc. He thought the sub-committee should co-operate with the research committee of the society and believed that the greatest opportunity of the sub-committee was to bring out at the annual meeting the latest developments in shop practice.

Dr. William Kent said that at the present time the machine-shop branch of mechanical engineering was

the least scientific and that the proposed plan afforded an opportunity for change. He suggested that the committee procure questions from machine-shop men as a basis for research work and endeavor to answer 10 questions and conduct one extended research each year. He was opposed to the Dewey classification system and favored a letter one rather than the mnemonic system proposed.

MEAGER INFORMATION ON MACHINE TOOLS

John J. Ralph said that data did not become obsolete as soon as was thought. He spoke of the lack of information about requirements for machine tools and said that machine shops did not know what tools were on the market. He suggested the compilation of factors about machine tools, such as floor space, depreciation, suitability, etc., with a view to weighing these various elements on a percentage basis if desirable. The method of testing tools for accuracy he said should be standardized and specifications similar to the boiler test rules prepared.

Charles J. Simeon, works manager, Reed-Prentice Company, Worcester, Mass., spoke of the difficulty of solving a problem in shop practice or manufacturing and then finding a solution of practically if not identically the same problem shortly afterward in the technical press. He considered the compilation of a glossary of information highly desirable and suggested the presentation of information in tabloid form.

Harry V. Haight, engineer, Canadian Ingersoll-Rand Company, Sherbrooke, Que., said that information on cutting speeds and feeds was available now as never before from munitions manufacturers, and work along this line should give the information requested by Mr. Heck.

Elmer H. Neff, Brown & Sharpe Mfg. Company, New York City, suggested that one page of the society's *Journal* be used each month to publish questions of interest, and said that it would bring very good results.

Mr. Barth commended the paper as a means of ending numerous experiments which were undertaken and which could be done away with if the plans for making data available were carried out.

There was considerable other commendatory discussion. One speaker said that manufacturers would cooperate with the committee in research work, and stated that colleges should be asked to solve one problem a year and report results. In this way the educational institutions would become interested in the movement and the United States would do what is being done abroad and should be done here in research work. The preparation of standard rules and forms for reporting data from machine shops was suggested as the first thing to be undertaken.

Necessity of Measuring the Efficiency of the Manager

Accomplishment as the sole measure of the right of a plant to exist was the keynote of the industrial valuation session of the American Society of Mechanical Engineers, held Thursday, Dec. 7. To compete with European industries following the war we must, it was emphasized, offer good commodities at low prices. Opinion generally was that this can be accomplished only through complete reorganization of our industrial system. The fault, it was agreed, does not lie with the workmen so much as with the management. "Our greatest incompetents," one impromptu speaker ventured, "are at the head of our plants, and a house-cleaning must begin there."

The papers which raised such enthusiastic response were prepared by Walter N. Polakov and H. L. Gantt, both consulting engineers of New York City.

Putting Value to Industrial Methods

Mr. Polakov, who specializes on beneficiating power plants, spoke on "Valuation of Industrial Properties versus Valuation of Industrial Methods." His address in part was as follows:

The loss to the companies from the undervaluation of their property is insignificant in comparison to the actual losses due to the lack of proper operating methods. The subject of correct methods of appraising a property is completely overshadowed by the importance of determining the proper methods of using this property. . . . What is needed most is the correct valuation of operating and managerial methods in vogue, for overestimating the importance of property valuation is like trying to trace old sins instead of preventing the committing of new ones.

It is a fact that the fixed portion of the capital invested in real estate and equipment has materially increased since the tractor replaced the ox plow; modern factory equipment has taken the place of artisans' tools and transportation is done by rail and automobiles instead of horses. The correspondingly increased financial burden has created a new problem: how to absorb the expense of wear and tear, obligations to money lenders, etc., increased by adopting expensive machinery of production as a result of engineering progress.

The solution offered by the financiers and accountants of the old school was to include in the manufacturing costs all the fixed charges of a plant and all the financial obligations of a company, irrespective of whether these investments or expenses contributed anything to the value of the commodity or in any way benefited the production. . . . Apparently the self-evident fact that the equipment not used in production cannot pass any part of its value into the product was usually obscured by a consideration that it loses value during idleness and meanwhile accumulates such charges as rent, interest, insurance, etc. This practice manifestly tends to charge against the cost of a product the cost of overequipment and mismanagement, thus imposing on society the penalty for tolerating these conditions in the industries.

When the cost of production increases after an investment is made it indicates plainly either that it was poor judgment to make the change or that the method of management does not offer the opportunity to secure the advantages inherent in the new improvement.

Nevertheless, the tendency of the average rate of profit to fall is only a manifestation of the development of the productive powers of society. Automatization, growing speed and capacity of machinery cause the same number of laborers in the same time to convert a larger quantity of raw and auxiliary materials into product. In other words, the fall of the rate of profit is not due to an absolute but only a relative increase of the capital invested in means of production over its part invested in labor.

At the outbreak of this war our country was rushing headlong into a period of industrial depression caused by surplus production that could not be consumed in the United States on account of the small purchasing capacity of the people, and could not be exported because poor shop methods prevented us from producing as cheaply as other countries. The undeveloped stage of our credit system contributed a further obstacle to the development of export. There was no incentive for us to plunge into the war, since there were no foreign markets to fight for; neither could anything be gained by a territorial expansion. A crisis seemed imminent, but the loading up of our industries with European orders postponed it.

Similar circumstances in Europe culminated in the present great war when German methods of production took away foreign markets from the countries whose workers could not consume at home all they produced. If it were not for the war between the nations a war within the nations might have been imminent. In the course of this struggle the most amazing reshaping of principles underlying the industrial life is taking place. Various governments have been forced to admit that the industries should serve the country, not the individuals. Handicapped by unscientific, disorganized production of the most necessary commodities, they have come to realize that the right to control and direct pro-

duction involves the responsibility of applying proper methods to secure beneficial results. Furthermore, precedents have been established where those who were not carrying on their business for the common good were denied the privilege of running it at all.

The misuse of or failure to use the expensive machinery of production is not a sufficient reason to either advance prices or to lower wages, as both undermine our future.

The revenue-producing factor in our mode of production is not the investment, but the method of its use. It is the business of financiers to invest money in industries, and they want to know what this investment is and what return they are getting. Ultimately the question they will ask is: What is the value of the methods and what do they do?

The use-value of the plant has nothing to do with its cost-value and is in the highest degree unfit for the purpose, as it varies with personnel, policy and methods.

Unfit methods and incapable leaders are equally harmful to both investors and consumers and their interests unite in demanding that methods of the highest value be developed and put into use.

In closing Mr. Polakov said the new business ideal is to make men dear and products cheap.

Charting the Management

Mr. Gantt, in introducing his paper, remarked that most efficiency has been inefficient. It has been an attempt to speed up workmen and has neglected the manager. The chart system is beginning to measure the efficiency of the man at the top. "The value of a thing," said Mr. Gantt, "should be measured by its ability to contribute to human happiness." The plant and equipment have static value, while the manager and engineer have dynamic value. In the past only the static value has been measured. We are adding something to the books called "Good Will."

THE BRITISH AWAKENING

They have just found it necessary to make a change in England. Lloyd George, more than any other one man, represents the working forces, the great producing force, of the British Empire. It was necessary to sweep away the old order, and put in charge the man who had made good. Now they are saying in England that if Britain is to win the war it must follow the plan Germany has been pursuing. The English had been seeing how much money and not how much ability they could accumulate. That policy is now shown to have been wrong.

Remember, we are in the same class with England. She has learned her lesson at last. I doubt if we have. If we were brought face and face to-day with the same problems that England has, the engineers would have to handle the problem, because the financiers couldn't do it.

The representatives of the forces of production in America to-day are the engineers, and the lesson must be learned that it is upon these producing forces and not upon mere dollars that national ability rests. America must consider first the value to the whole community.

Mr. Gantt's paper was in part, as follows:

If there is any one thing which has been made clear by the war it is that the most important asset which either a man or nation can have is the ABILITY TO DO THINGS. Our industrial and economic developments have in the past been largely based on the theory that the most important quality a man can possess is, his *ability to buy things;* but the war has distinctly shown that this quality is secondary to the *ability to do things.* The recognition of this fact is having a most far-reaching effect, for it makes clear that the real assets of a nation are properly equipped industries and men trained to operate them efficiently. The money which has been spent on an industrial property, whether it has been spent wisely or unwisely, and the amount of money needed to reproduce it are both secondary in importance to the *ability of that plant to accomplish the object for which it was constructed,* and hence cannot be given the first place in determining the value of the property.

To determine the value of an industrial property, we must be able to know with accuracy the cost at which it can produce its product, and the amount it can produce. To compare two factories on this basis, their cost systems must be alike; for, if there is a lack of agreement as to methods of cost accounting, there will necessarily be a lack of agreement as to the estimated value of the properties. There are many methods of cost accounting; but there are only two leading theories as to what cost consists of. They are:

1. That the cost of an article must include all of the expense incurred in producing it, whether such expense actually contributed to the desired end or not.

2. That the cost of an article should include only those expenses actually needed for its production, and any other expenses incurred by the producers for any reason whatever must be charged to some other account.

DR. IRA N. HOLLIS

President of the American Society of Mechanical Engineers. In September, 1874, at the age of 18 years, he entered the U. S. Naval Academy. In 1884 he served with the advisory board that built the four ships of the White Squadron. In 1892 he was ordered to the Bureau of Steam Engineering under George W. Melville, then Engineer-in-Chief. On Oct. 1, 1893, he resigned from the navy to become professor of engineering at Harvard University. In 1913 he resigned to take the position of president of Worcester Polytechnic Institute just before the transfer of Harvard's engineering department to the Massachusetts Institute of Technology.

WHAT KNOWLEDGE OF IDLE MACHINERY DOES

When plants are operated at their full capacity, both theories give the same cost. When, however, they are operated at less than their full capacity, the expense of carrying the idle machinery is, under the first theory, included in the cost of the product, making the cost greater; while under the second theory, this expense of idle machinery is carried in a separate account and deducted from the profits, leaving the cost constant. It is most interesting to note that, *when costs are figured on the second basis, great activity immediately ensues to determine why machinery is idle, and to see what can be done to put it in operation.*

If we buy a machine for $1,000 we lose the interest on that $1,000, say at 5 per cent per year, then we have taxes on that machine at 2 per cent and insurance of 1 per cent. Further, the machine probably depreciates at a rate of 20 per cent per year, and we must pay $50 or more per year for the rent of the space it occupies. All

these expenses, together $330, go on whether we use the machine or not. Thus, the simple fact of our having bought this machine and kept it takes from our available assets approximately one dollar per day.

If now the cause for idleness is ascertained each day we can find the expense of each cause of idleness as shown on the accompanying chart. That part which is due to lack of orders points out that our selling policy is wrong, or that the plant is larger than it should be —in other words, that somebody in building the plant has overestimated the demand. It is clear, however, that no conclusion should be based on the figures for one month, but on the results for a series of months during which the problem has been carefully studied. If a mistake has been made in building too large a plant, an effort should be made to determine the proper disposal, or utilization, of the excess in order that the expense of idleness may be taken care of, even if no profit can be made.

If the expense is due to lack of help, we must investigate the labor policy. Expense due to lack of, or poor, material, is an indication of the efficiency of the purchasing policy and storekeeping system.

If in any case the expense of idleness is greater than can be attributed to all of these causes together, it must go in the last column as poor planning.

In several cases, such an investigation resulted in the scrapping of machinery which had been idle for years. The space thus saved was used for a purpose for which the superintendent had felt he needed a new building. In another case it resulted in the renting of temporarily idle machinery at a rate which went far toward covering the expense of carrying that machinery.

Still another factor enters into the value of a "going plant." We all have known cases where the same plant operated under one manager was a failure, and under another a very decided success. The value of a going plant, therefore, consists of two elements, namely, the value of the physical real estate and equipment, and the value of the organization operating it. In considering the value of an organization we should realize that it lies not so much in the personality of the managers or leaders (who may die or go elsewhere) as in the permanent results of their *training and methods, which should go on with the business*, and are therefore an asset and not an accident.

If the above premises are correct, the following factors are important elements in determining the value of an industrial property:

The cost of the product
The capacity of the plant
The portion of the plant operated, and
The expense of maintenance of the idle portion.

MILL, Textile June, 1916.

SYMBOL	DEPARTMENT OR MACH. CLASS	% OF CAPACITY USED ON Day TURN	TOTAL EXPENSE OF IDLENESS	DETAILS OF IDLENESS EXPENSE DUE TO: LACK OF WORK	LACK OF HELP	LACK OF AND POOR MATERIAL	REPAIRS	POOR PLANNING	REMARKS
	Spinning		18 70	18 70					
	Winding		118 74		103 74		15 00		
	Doubling		10 61	10 61					
	Twisting		17 95	17 95					
	Quilling		20 67	10 67	10 00				
	Warping		390 75			390 75			Lack of Wound Yarn
	Weaving		915 25	75 00		840 25			Lack of Warps
	Finishing		210 72			210 72			Lack of Woven Goods
	Inspecting		49 70		10 70	39 00			Lack of Woven Goods
	Shipping		216 17	66 00		150 17			Lack of Woven Goods
	Total		1969 26	198 93	124 44	1630 89	15 00		

APPROVED BY SUPT.

Patent Applied For.

Charting Idle Time of Machines and Giving Reasons and Costs, All for the Benefit of the Manager

VIEWS ON CHARTING THE MANAGER

W. S. Rogers, president Bantam Anti-Friction Company, Bantam, Conn., enthusiastically endorsed opinions of the two speakers quoted. He said, "We handle the poor fellow at the machine and try to make him part of it. He is blamed for the mismanagement of the men at the top, whereas most directors are there not for their ability but because they put the most money into the business. Everyone of my men has been supplied with copies and asked to read a story recently published in the Saturday Evening Post and entitled, 'The Man Who Wanted To Be It.'"

Carl G. Barth, Carl G. Barth & Son, Philadelphia, told of an experience in taking charge of a losing proposition and making of it a profitable business. When he called on the president he entered the typical well-equipped room with a long table surrounded by many comfortable chairs. The president thought he was going to buy new machines and establish a scheme for making the workmen turn out more products. "Just then," said Mr. Barth, "I saw the picture on the wall of a former president and under the picture the motto, 'Make Men, not Money,' and I adopted that as my motto and told the president that is what I wanted to do. I wish I could describe the look on the president's face. He understood. We both had the feeling for humanity."

F. G. Coburn, U. S. Navy, referred to Mr. Gantt's chart and asserted that it would show exactly how much to charge the customer and what goal in the manufacturing field the plant should strive toward.

EXPERIENCES WITH CHARTS

H. M. Wilcox, Winchester Repeating Arms Company, uses a chart similar to Mr. Gantt's. It tells them, he said, exactly how much and where the loss is. It has also released energy which was not in evidence before. Men become interested in their work when they learn how to improve their methods and know that a charting will show where the fault lies.

A further improvement on the chart was exhibited by J. E. Melaney. The maximum output decided by test is plotted with dark lines while red lines measure the exact percentage of the maximum actually obtained.

A record department should be established in every business, was the contribution of W. C. Brinton, consulting engineer, New York City, to chart the entire plant. Unless the head of the department reported to the general head, he feared, this unfortunate man would be without friends. Directors of such work should be capable and well paid.

A suggestion which looks far into the future was made by A. C. Jackson, Miller Lock Company, Frank-

ford, Pa. He said, "I hope for the development of the whole industry by a chart in which all industries will be included." He added that it will show what the limitations of an industrial field are and what plants have a right to continue in the field.

SESSION ON CO-OPERATION OF WORKMEN

A separate session on industrial management was also held by the American Society of Mechanical Engineers, Wednesday afternoon, Dec. 6. It had been a late arrangement and one of the smaller rooms of the Engineering Societies' Building was set apart for it, but so great was the interest that the room was crowded and extra chairs had to be brought in. This statement is made to indicate what interest in management problems there was among large numbers of those attending the meeting. Three papers were read, one "Aids to Secure the Co-operation of Workmen," by E. E. Barney, superintendent Remington Typewriter Works, Ilion, N. Y.; another, "Standardization in Industrial Management," by Sanford E. Thompson, consulting engineer, Newton Highlands, Mass., and the third, "Graphical Control on the Exception Principle for Executives," by Frank B. Gilbreth, consulting engineer, Providence, R. I.

The discussion quickly took up the development of the human relation in factories. W. S. Rogers, president Bantam Anti-Friction Company, Bantam, Conn., told in some detail how his plant was started and how those in the higher executive positions form what is known as the senate, and the others the members of the house and how matters are decided by one or the other or by both bodies, even, for example, the engagement of a new salesman, who must be acceptable to the senate. Many of his employees are stockholders in the business.

Arthur J. Baker, Cincinnati Milling Machine Company, Cincinnati, told what has been done at his plant to secure co-operation of the workmen. One of the best moves in this connection was to establish a health service and in this the important point has been the selection of a doctor; it is proved that he must be of the right caliber. In their own case he has inspired confidence in himself and has relations with the men that the officers of the company could not hope to secure. Out of some 1600 employees as many as 250 calls have been made in a day on the doctor and, of course, for things apart from physical ills. His confidential relation led to investigations and improvements in plant conditions and among other things resulted in a co-operative luncheon arrangement operated wholly by the employees, the company merely supplying at the beginning the equipment necessary. The doctor has been able to discuss food values, resulting in educating the workers respecting inexpensive but valuable foods, at least from the energy standpoint.

Out of these relations has grown a mutual aid society and the doctor has a hand in the hiring and firing, and the whole effect is securing an attitude which makes the men a part of the plant. Besides an individual bonus for individual performances, a quarterly bonus is allowed if plant or department output exceeds some stated quantity for the period, and Mr. Baker suggested that the best sign of a satisfactory condition within the plant is that at the time of the recent strikes in Cincinnati, the Cincinnati Milling Machine employees, without suggestion, organized their own anti-strike committee.

As regards the use of graphics for the guidance of executives, offered by Mr. Gilbreth, it is planned to give this paper in a later issue.

Taylor Society Contributions

The Taylor Society, besides considering scientific management applications in hospitals and the planning of power-plant work, the latter based on a paper by Mr. Polakov, had a session on Saturday afternoon, Dec. 9, and on Saturday evening. The afternoon session revolved about the lack of efficiency among executives in industries, and the evening session discussed largely the question of initiative on the part of the worker engaged under scientific management and his spirit of co-operation. Besides engineers and managers, economists and sociologists participated, and also a leader of organized labor. The burden of the discussions was that the worker has abundant opportunity for self-expression under scientific management.

The afternoon discussion was based on a paper by Dr. Horace B. Drury, instructor in economics and sociology, Ohio State University, Columbus, Ohio, on the progress scientific management is making. Lieut. Frederic G. Coburn, U. S. N., opened the discussion and emphasized that too much time was commonly spent talking on the matter of time studies. It was also brought out that if the personal factor is divorced there is an approach to mere welfare work in the plant. It is argued that industry has passed the period when there was an utter disregard for the worker to the present time, when there are coercion measures to minimize the standards of treatment, and that the tendency now is toward a voluntary study to improve conditions without coercion. It was explained, for example, that after the Civil War men worked 12, 14, and 16 hr. a day, sometimes with no attention to working conditions and nothing in the nature of welfare. At the present time we are having considerable legislation to force a minimum standard of good treatment and the transition is now toward the third stage.

H. L. Gantt discussed his chart to measure the management; this reproduced in the foregoing account of the engineers' meeting.

Appraising Industrial Plants

John G. Morse, Factory Mutual Fire Insurance Companies, at the valuation session of the American Society of Mechanical Engineers, spoke on "Accurate Appraisals by Short Methods." A review of this paper may find space elsewhere in this issue. "The Relation Between Perpetual Inventory and Appraisal Value" was the subject of a paper by Charles Piez, president Link Belt Company, Chicago, printed at length in THE IRON AGE of Nov. 30. John H. Gray, professor of economics, University of Minnesota, read a paper on "How Does Industrial Valuation Differ From Public-Utility Valuation?" He said W. J. Bryan inaugurated valuation under court control. The reproduction theory, he said, was an attempt to assure value to watered stock.

Dean M. E. Cooley, University of Michigan, referred to a specific case where, in endeavoring to determine the depreciation, it was calculated that the original plant had cost $180,000, whereas, after 25 years it would cost $360,000 to replace it. The machines were 18 to 25 years old.

L. S. Randolph, Polytechnical Institute, Blacksburg, Va., decried the use of the word "depreciation" and said that he had found "productive life" covered a broader field and was more suitable.

The appraisal commission of Pennsylvania, thought Morris Knowles, University of Pittsburgh, was an organization which would prove of great value in the field of appraisals. A case is always referred to two engineers representing the plant and the other party with the chief engineer of the commission presiding. "When engineers face each other across a table," said Mr. Knowles, "each one can tell if the other knows what he is talking about." In making appraisals, Mr. Knowles urged that where a sinking fund is provided a valuation of 100 per cent should be made; otherwise depreciation should be subtracted.

Dr. William Kent, construction engineer, Montclair, N. J., pointed out that there are two kinds of obsolescence. 1—the depreciation of a machine; 2—going out of the market of products, leaving machines in good mechanical condition. An inventory, he said, will rise and fall according to the condition of repair. In appraisals the earning power of a plant should always be a prime factor.

"What is the value of the valuation?" L. K. Frank thought was the principal question to be considered. Social control, he argued, is coming, and the engineer should assist, not hinder it.

(*Continued on page* 1350)

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November Steel Orders

In view of market conditions during November the steel trade was prepared to see the Steel Corporation report a very large increase for the month in its unfilled obligations, and such expectations were certainly not disappointed when the report showed unfilled tonnage at the end of November amounting to 11,058,542 tons, representing a gain of 1,043,282 tons.

The November bookings were not made up largely of "open contracts" of the form that prevailed so largely in the last buying movement, that of 1912. There were large tonnages of rails, car material, ship material, and shell steel. The principal contract tonnage was in sheets and tin plates, books having been opened for the first half of 1917 on Oct. 12. These contracts, however, are now regarded as binding, the buyer being expected to take out the entire quantity on time, and at the contract price, irrespective of market conditions. Dividing the total tonnage on books into open contract business and specific job business, the average date of delivery of the latter is farther ahead of the average delivery date of the former than has ever been the case before.

From the long-range view, tonnage has not piled up as rapidly on the Steel Corporation's books as it has in previous market movements. In October, 1912, the increase in unfilled obligations was 1,042,874 tons. In this movement the largest increase for a month, until last month, was the 1,024,037 tons shown for November, 1915, not altogether as large an increase as was shown for October, 1912, and relatively a much smaller one, as the corporation's production is about 25 per cent greater. The corporation's largest order book in the 1912 movement was on Dec. 31 of that year, 7,932,164 tons, practically the entire accumulation having occurred in the nine months preceding. With the smaller capacity of that time, the obligations represented an average operation of 7½ months. With the corporation's capacity of this year, it was not until early last April, when the improvement in the steel industry had been in progress for 15 months, that it reached the point of having tonnage obligations equal to its output for 7½ months. Even after the enormous bookings of last month the obligations were equal to the production of eight months.

The pressure on the part of buyers to get under cover has been vastly greater in this movement than in that of 1912, but there has been the offset that the mills have pursued a much more reserved sales policy. Instead of accepting open contracts freely, they have confined their commitments largely to the sale of specific tonnages for specific use. They have, indeed, reserved tonnages at various times for certain classes of customers, only putting the business on books at the last moment. Thus the mills are assured of full operation for a much longer period ahead than was the case at the close of 1912, although the bare figures, set on paper, show scarcely any difference.

A Remarkable Ore Year

The cry of Lake Superior ore shortage has gone up so often in the season of navigation now closing that it may have helped to secure the abundant supply of iron ore indicated by late figures. All through the year the steel trade has appreciated the possibility of an ore movement inadequate to cope with a 40,000,000-ton output of pig iron. Before navigation opened there were predictions that the machinery of transportation and of ore handling on the Lakes was not equal to getting down 60,000,000 tons of ore in a season. It now seems likely that the total for the year, including all-rail ore, will exceed 66,000,000 tons.

It was conceded at the beginning of the season that every link in the chain that connects iron mines and furnaces would need to hold perfectly throughout the seven and a half months of navigation to meet the needs of the pig-iron producers. It is now seen that the season has been extraordinary in the working together of all the factors in iron mining, Lake transport and unloading at lower Lake docks to secure the most favorable results. There was a strike on the Mesaba range which might have brought serious curtailment of output but did not, and in November there was a scare because of the unseasonable coming on of severe winter in upper Lake districts. But the year's provisions for thawing ore at upper Lake docks were unusual, in view of the necessity of shipping late, and the freeze-up gave way to milder weather so that the closing will be the latest in years. There were no serious storms in the sea-

son, at least none that scattered the fleet for any long time. Added to all else that was favorable, for most of the season there was a foot more of water than the average of 1915 and this added 7 or 8 per cent to vessel loads. The fact is that with all the hue over possible ore shortage, the season ends with more ore on docks and in furnace yards in proportion to the needs of the furnaces at the present rate of operation, than has been the case in years.

It is early to borrow trouble about 1917, but under the law of averages next year might not be expected to have so perfect a concurrence of favorable factors. For one thing, the depth of water in the Lake channels is now less than the average for the past season. The most important consideration has to do with the railroads. A shortage of iron ore carried with it so many serious possibilities, national and international, that in the past season the railroads worked as they have never been known to work to give the fastest dispatch to ore boats at Lake Erie docks. Locomotives and cars have been worn out in this service. There is also the fact that having catered in an unprecedented way to ore shippers the railroads are now recognizing their obligations to traffic in other lines. With plenty of ore down, they are trying to make up for neglects in other directions, and may enter the spring with larger use of their equipment for service from which it cannot readily be taken again to haul ore. It is a question how far cars and locomotives now under contract will make up for equipment worn out in the high pressure ore operations of this year. The vessel situation will be better next year. That is admitted. Careful estimates indicate that new vessels to be completed in the coming winter and those promised for various times in the season of 1917 will add 3,000,000 tons to the movement of this year.

The continuance of a 40,000,000-ton rate of pig-iron production over a year is entirely possible, in spite of the chance of coke and car shortages in the next four months. That would mean a demand for 63,000,000 to 64,000,000 tons of Lake Superior ore a year. With other blast furnaces coming on, though they are not numerous, a rate of 42,000,000 tons of pig iron might be reached after the new season of navigation opens. That, if kept up, would suggest some increase over this year's ore movement, but it should not be overlooked that the season of 1916 has actually furnished a surplus of ore, and therefore that strain for a new record may not be necessary in 1917.

Tightness in Money Reappears

One of the measures for which the present Administration has claimed great credit is the establishment of the Federal Reserve system. In fact, this effort at constructive legislation has been frequently singled out by spokesmen for the Administration as its masterpiece. It has been assumed that through the workings of the Federal Reserve act the country is no longer in danger of panics, as it has been claimed that whenever a financial exigency arose the necessary funds would be automatically available for financial relief. At last we had been given an elastic financial system comparable with those existing in other great countries. Of course, this carried with it the easy confidence that no such thing as a pinch in money rates could again take place in our financial markets, as was formerly the case every autumn and winter, but that reasonable terms for interest were assured.

Within the past few days, however, a demonstration of some weakness in the workings of the Federal Reserve act has taken place. Although for many months a golden stream has been flowing into the United States from foreign countries, a stream of such extraordinary extent that some banking interests have professed to be alarmed because this tremendous addition to our stock of actual money appeared almost to impose inflation, a severe scarcity of money was felt last week in New York and rates on call loans ran up as high as 15 per cent. The situation was then relieved by the fortunate importation of additional gold, but this week again a squeeze of the same kind occurred, showing that the situation had simply been ameliorated and not completely remedied. Thus it appears that the highly praised Federal Reserve system has not completely solved the monetary situation for this country.

The New York *Commercial and Financial Chronicle*, in dwelling upon these developments, states that the tightness of money is caused by the reduction in the money holdings and surplus reserves of New York clearing house banks and trust companies through the Federal Reserve Bank located in New York City. These banks have been losing heavily in money and surplus reserves every week through that channel since the beginning of November, and financial authorities have directed attention to the possibility of some embarrassment on that account. Enormous amounts were thus transferred from New York, the financial center, to other points through the Federal Reserve clearing house system. It is pointed out that the enforcing of a low level of interest rates in other parts of the country has served to remove the restrictions existing in the past upon unsound business developments. At the same time it has created new problems and a perplexing situation for New York banks while removing none of the old ones.

It will of course be claimed that the New York rates of interest are largely local and that they apply mainly to speculation in stocks. While this cannot be completely denied, yet New York has such a commanding influence on the financial situation in this country that high rates of interest in that city have a very great effect on business matters in other sections. If it is found that the Federal Reserve banks are unable to restore an adequate amount of funds to the New York banks to replace to a sufficient extent what has been drawn from them to other parts of the country, interest rates in New York will, as in the past, be raised to a level that will attract money to that city, causing the pinch to be felt elsewhere. This has frequently been experienced in the past, and it was just such a condition that it had been hoped would be remedied by the much praised Federal Reserve act.

The Steel Corporation and Thompson Coal

The sale of Greene County coal acreage just arranged between the Josiah V. Thompson creditors' committee and the H. C. Frick Coke Company of the Steel Corporation only serves to direct attention to the fact that the Thompson coal lands are moving very slowly indeed. The acreage taken by the greatest coke-consuming institution in the world is only about one-fifth of the Thompson holdings in Greene County alone, and represents but a slight addition to the Steel Corporation's coal reserves. The appraisement made some time ago placed the Thompson acreage in Greene County at 58,403, and it appears that 12,000 acres have been sold to the Steel Corporation at about $500 an acre.

The Thompson failure occurred in January, 1915, when it was not entirely clear that business and finance had begun to recover. It has required nearly two years and the establishment of an industrial pace undreamed of, with surplus earnings beyond former possibilities of conception, to make a narrow market for the coal land at a price lower than was paid for some of the later of the Thompson acquisitions. The price to be paid by the Steel Corporation represents approximately its surplus earnings at the current rate for about 15 business days.

It is true that in recent years the steel interests have become less disposed than they were ten years or more ago to carry large reserves of minerals in the ground, but at the present time large surpluses are accumulating, and it is impossible, on account of the state of the labor and machinery markets, to make anything like as large investments as are desired. The restriction as to capital available is entirely removed.

The Steel Corporation's coal holdings, as shown by its last report, comprise, in the North, 66,611 acres of Connellsville coking coal and 64,848 acres of Pocahontas coking coal, with 96,618 acres of steam coal in other districts, and in the South 317,038 acres of coking and steam coal, making a grand total of 545,115 acres. Thus a purchase of 12,000 acres of coking coal represents an increase of 9 per cent in the Steel Corporation's Northern coking-coal acreage and an increase of 2.2 per cent in its total coal acreage.

The failure of Greene County coking-coal acreage to find a ready sale to the ultimate consumer at high prices was due, of course, to the rapidly increasing vogue of the by-product coking process, a development which Mr. Thompson appears to have been too busy to be able to appraise at its true value. By-product coking involves a totally different set of conditions from beehive coking. Of primary importance is the fact that the by-product oven is located at the point of coke consumption, and the coal is brought to it, while the beehive oven is located over the coal. As the by-product coal must be shipped, it is possible to ship it from various points. There is competition between different districts to sell coal to the by-product ovens, while to make feasible the building of a beehive plant one must provide himself with sufficient coal to last a considerable time. The by-product operation is practically assured of being able to buy coal year after year. Freight rates may change, and what is the cheapest coal delivered one year may not be the cheapest another year. Before the by-product process was improved to its present stage those who embraced it recognized the fact that while the capital outlay in ovens was very large, relative to beehive, there was a great offset in that it became unnecessary to make a large outlay in coal land.

Possibly the most important thing that has been learned in recent years with respect to the selection of coal for by-product coking is that there is still a great deal of information to be acquired, as was plainly stated by an official of the H. Koppers Company in a presentation of the whole subject of by-product coking before a section of the Engineers' Society of Western Pennsylvania a fortnight ago. There are coals that were thought, a few years ago, to be very promising for by-product coking, but are not favorites now, while other coals formerly considered impossible have lately been made to produce good results. Some of the divergences are probably due to changes in the oven design and changes in methods of operation. Widely variant results are obtained by changing the proportions of the coal used without changing the coal. So much knowledge seemed possible of acquisition in the future, indeed, that the speaker observed that the time was coming for the formation of a society of by-product coke engineers which should consider in particular the selection and proportioning of coals for coking. In such circumstances it is natural that the builders of by-product ovens should not rush to commit themselves as to the coal to be used over a period of years.

To Promote Efficiency Legislation as Regards Industry

The movement to prevent legislation antagonistic to efficiency in industry, started by the Committee of Ten, so called, out of an informal meeting of well wishers of scientific management held a year ago, is to be carried on in a broad educational way by a committee of the Chamber of Commerce of the United States. The personnel of the committee is as follows: Homer L. Ferguson, president Newport News Shipbuilding & Dry Dock Company; Richard A. Feiss, Joseph & Feiss Company, Cleveland; Charles Piez, president Link-Belt Company; L. S. Gillette, Minneapolis Steel & Machinery Company, Minneapolis; William Butterworth, Deere & Co., Moline, Ill., and W. Herman Greul, Otis Elevator Company, New York.

Steel-Plate Exports Exceed Records

Steel-plate exports are assuming larger proportions with each month, due partly to the foreign demand for ship plates. The exports in September were 24,385 gross tons and in October, 26,399 tons. This brings the total to Nov. 1, 1916, to 222,901 tons, or at the rate of 22,290 tons per month. To Sept. 1, 1916, the monthly rate was 21,514 tons. The previous record was in 1913, when the total was 223,814 tons, or 18,651 tons per month.

Of the 4,759,536 lb. of copper bars shipped in 1915 at the Chilean port of Antofagasta, 3,976,506 lb. came from the new plant of the Chile Exploration Company, an American corporation, the first unit of which was built last year at Chuquicamata, Chile. It was designed to treat 10,000 tons of low-grade copper ore per day. It began operating in May, 1915, but the full output was not reached until the end of the year.

NAVAL VS. MERCHANT VESSELS

Shipyards Cannot Build More of the Former Except at the Expense of the Latter

WASHINGTON, D. C., Dec., 12, 1916.—In recommending a reduction from 62 to 52 in the number of ships included in the building program of the General Board of the Navy to be appropriated for at the present session of Congress, Secretary Daniels, in his annual report, makes the significant statement that existing conditions in the private shipyards of the country, as well as in the Government navy yards, are such as to preclude the placing of contracts during the fiscal year beginning July 1, next, for more than 42 ships, including 3 battleships, 1 battle cruiser, 3 scout cruisers, 15 torpedo boat destroyers, 4 fleet submarines, 14 coast submarines, 1 fleet submarine tender and 1 destroyer tender. Concerning conditions in the navy yards and private shipbuilding plants the Secretary says:

The navy yards are not yet prepared to add materially to the facilities for construction. The private yards have obtained more contracts for merchant ships in the past year than in a long period, and their facilities for building ships for the navy are limited. Moreover, the revival in shipbuilding and the big naval program of the fiscal year 1916 have about taxed their capacity. In addition, the number of skilled men in the shipbuilding industry has not grown with the increased demand, and the demand for materials of all kinds has caused a rise in price and a delay in delivery. It will tax the Government and private yards, even after new facilities are provided, to build the ships recommended for the fiscal year 1918 and complete those heretofore authorized.

The private and public yards cannot, unless they abandon building merchant vessels, build a larger program than I have recommended. The crowded condition of shipyards, the difficulty of securing labor and material, and the reports made to me by the officers of shipbuilding yards all unite in convincing me that the largest program that can be constructed, under present shipbuilding conditions in this country, is that which I have recommended, and which I understand meets the policy which Congress incorporated in the last naval bill, to wit, 156 ships to be commenced in three years.

COMPULSORY PRECEDENCE TO GOVERNMENT WORK

The Secretary foreshadows the possibility of an appeal to Congress to clothe the Navy Department with the power to compel private shipyards to give precedence to Government work to meet a serious emergency. In this connection he says:

The last naval bill does not give to the department any additional or extraordinary powers in connection with placing the contracts for these vessels or in obtaining materials for their construction. It is hoped that the necessity will not arise of having to ask for such powers, as a number of shipbuilders and manufacturers have shown an attitude of willingness to assist the department in meeting the unusual situation created by the desire of the country to commence and to expedite an entirely unprecedented naval program at a time when the industrial resources of the country are already taxed to their utmost capacity in meeting the demands of tremendous trade activity, both domestic and foreign, in every branch of business. It may be necessary, however, for Congress to enact legislation of this character to insure the early completion of the program of construction.

Concerning the building of warships in navy yards the Secretary reviews the work done during the past year in improving the construction facilities at New York, Mare Island, Philadelphia, Boston, Portsmouth, N. H., Norfolk, Va., and Charleston, S. C., as the result of which, he says, war vessels ranging from battleships down to submarines may be built in these yards. Continuing, he says:

In addition to this accomplishment, the recent naval act authorizes the expenditure of $6,000,000 for fitting navy yards for ship construction, and steps are being taken to fit yards for the construction of capital and other ships. It is confidently expected these improvements will be far enough advanced so that some of the ships to be provided for in the naval act of the coming session of the Sixty-fourth Congress can be laid down at these yards.

EARLY START ON ARMOR PLANT

On the subject of the purchase of armor and the construction of a Government armor plate plant, the Secretary describes his negotiations with the armor manufacturers which he says resulted in saving "in less than four years the rather neat sum of over $2,000,000." This saving, he says, was due to the fact that "the Navy Department, making public the lack of competition, refused to pay the higher prices demanded and urged Congress to erect a Government plant." He adds that plans are now being prepared for the building of the armor plant for which Congress appropriated $11,000,000 at the last session and "early in the new year" work will commence on its construction and when completed "not only will the Government be in position to make a portion of its armor at lower prices than it has been paying, but improvements in the manufacture of armor plate by our experts will belong exclusively to our Government, an advantage not to be lightly regarded." W. L. C.

LATER.—Secretary Daniels has advised the House Committee on Naval Affairs now engaged in drafting the annual naval appropriation bill that he will submit an amendment to the bill compelling shipbuilders, steel companies and other manufacturers to give preference to Government orders for military supplies. In his testimony before the committee to-day he said he had reached the conclusion that such an amendment was necessary to hasten warship construction. He asserted that the shipyards were not only filled with merchant work but were unwilling to attempt any form of novel construction. The Secretary made no comment upon the fact that innovations in shipbuilding are as costly as in other lines of manufacture and that the limits of cost fixed by Congress for the battle cruisers and scout ships are believed to be considerably below the actual cost of building them, to say nothing of the fact that all the leading shipyards are now rejecting merchant work tendered at prices guaranteeing handsome profits.

Foreign Trade Convention at Pittsburgh

As chairman of the National Foreign Trade Council, James A. Farrell issued the call this week for the fourth convention under the auspices of the council to be held at Pittsburgh, Jan. 25, 26 and 27. The general topics to be discussed are the following:

1. Conditions in foreign markets after the war, including the European economic alliances, and the measures necessary to safeguard American foreign trade, as well as the foreign trade aspect of the American tariff system.
2. Co-operation in foreign trade: The necessity for the relief of exporters from the restrictions of the anti-trust laws, which now oblige them individually to meet combinations of foreign rivals encouraged by foreign governments to resist American competition, and often to sell to combinations of foreign buyers, equipped to depress the prices of American products.
3. Shipping: The revival of the American merchant marine.
4. Foreign investment of American capital in its relation to oversea commerce.
5. Problems of the smaller manufacturer: How this class of industries, producers and merchants may more effectively enter foreign markets.

The group session plan, which gave such good results at the St. Louis and New Orleans conventions will be followed again, and in these meetings experiences will be interchanged and advice given in an informal way by those who have had most to do with export trade. The subjects of stated papers include "European Reconstruction," by W. W. Nichols of the Allis-Chalmers Company, chairman of the American Industrial Commission to France; "Foreign Trade Aspect of the Tariff," by Willard Straight, vice-president American International Corporation; "Government and Foreign Trade," by Edward N. Hurley, chairman of the Federal Trade Commission; "How Commercial Organizations Can Aid Foreign Trade Development," by F. J. Koster, president of the San Francisco Chamber of Commerce. The National Foreign Trade Council will present to the convention a report on world trade conditions after the European war. Robert H. Patchin, secretary of the council, will speak on the need for enacting the Webb bill, already passed by the House and now before the Senate, permitting American corporations to co-operate in the export trade.

NEW BATTLE CRUISER BIDS

Four Shipyards Offer to Build at Cost Plus 10 to 15 Per Cent Profit

WASHINGTON, D. C., Dec. 12, 1916.—The Navy Department is about to undertake an experiment in the letting of contracts for warships which is a decided innovation. Arrangements will probably be made on the basis of bids opened Dec. 6 for the construction of the four battle cruisers, Nos. 1 to 4, authorized by the last naval appropriation act, the Government agreeing to pay the actual cost of building plus a percentage of profit to be determined by the Secretary of the Navy and the bidders, possibly with the assistance of the Federal Trade Commission. Contracts for the construction of one cruiser each will probably be awarded to the Newport News Shipbuilding & Dry Dock Company, the Union Iron Works, the Fore River Shipbuilding Corporation and the William Cramp & Sons Ship & Engine Building Company.

In recognition of the fact that the battle cruiser is a new type of warship in the United States Navy, having engines six times as powerful as those installed in any other war vessel and with a required speed many knots in excess of the swiftest battleships, Congress, in the last naval appropriation act, authorized the Secretary of the Navy, if he should deem it to the public interest to do so, to contract for the building of these four vessels on a basis of cost plus a reasonable profit. The pressure on the leading shipyards of the country has become greater daily since the naval appropriation act was passed and the department has already been obliged to re-advertise three of the four scout cruisers because of the unwillingness of private shipyards to undertake their construction within the limit of cost fixed by Congress.

BIDS FOR BATTLE CRUISERS

Naval officials, therefore, were not greatly surprised when the bids for the battle cruisers were opened to find that all the bidders declined to fix an upset price, proposing only to build the vessels on a basis of cost plus a profit ranging in the various bids from 10 to 15 per cent. The proposals in detail were as follows:

Class 1.—Department's design.

Class 2.—Hull and equipment of department's design; machinery of bidder's design.

Newport News Shipbuilding & Dry Dock Company, Newport News, Va.

Class 1:

1 vessel, at Newport News, within 51 months, for actual cost plus 10 per cent as profit.

Fore River Shipbuilding Corporation, Quincy, Mass.

Class 1 or class 2; if class 2 machinery of the Curtis turbine geared type; 180,000 shaft hp.:

1 vessel at Quincy, within 48 months, for actual cost plus 15 per cent profit, or such percentage of profit as Federal Trade Commission may determine to be reasonable.

Union Iron Works, San Francisco, Cal.

Class 1 or class 2; if class 2, machinery of the Curtis turbine geared type; 180,000 shaft hp.:

1 vessel at Alameda or San Francisco, within 48 months for actual cost plus 15 per cent profit, or such percentage of profit as Federal Trade Commission may determine to be reasonable. Vessel to be in accordance with plans, specifications, modified form of contract, etc., submitted by Fore River Shipbuilding Corporation for these vessels.

William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa.

1 vessel at cost plus 10 per cent commission.

Three of the four bidders submitted extended statements of the reasons for their inability to take on the battle cruiser contracts at upset prices.

While the Secretary of the Navy unquestionably has authority to make contracts for the construction of these vessels on a basis of cost plus a reasonable profit, a complication is seen in the fact that in appropriating for these ships Congress fixed a total cost limit of $16,500,000 each. Under another provision of the naval appropriation act the Secretary may pay a bonus not to exceed 20 per cent of the cost of the ships for expedited delivery so that if the periods of construction stated in the proposals are reduced to the satisfaction of the Secretary he will be in position to pay $19,800,000 each for the four cruisers.

Inasmuch, however, as the bidders decline to fix even this sum as an upset price the Navy Department finds itself in a quandary concerning its authority to let the contracts. It is probable, therefore, that Department officials will confer with the leading members of the House and Senate Naval Committees in addition to consulting the law officers of the Department before making any awards. In any event it is understood that if contracts are made on a basis of cost the margin of profit to be allowed by the Government will be the same in case of all contractors. In the opinion of naval experts it will not be practicable for the Department to consider a proposition made by the Fore River Shipbuilding Corporation to employ a sliding scale by which the builder's profit will decline as the cost exceeds an agreed estimate and vice versa. W. L. C.

Steel Corporation's Largest Order Book

Unfilled orders on the books of the U. S. Steel Corporation at the close of business on Nov. 30, 1916, were 11,058,542 tons, the largest total ever recorded. This was an increase of 1,043,282 tons over the orders reported as unfilled on Oct. 31, 1916, a month previous. This is also a record for one month's expansion. A year ago on Nov. 30, 1915, the books showed 7,189,489 tons and on Nov. 30, 1914, only 3,324,592 tons. The orders at present are over three times those at the same time two years ago. The following table gives the unfilled tonnage at the end of each month from January, 1913:

	1916	1915	1914	1913
January	7,922,767	4,248,571	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,468,956
April	9,829,551	4,162,244	4,277,068	6,978,762
May	9,937,798	4,264,598	3,998,160	6,324,322
June	9,640,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,589	5,390,356
August	9,660,357	4,908,445	4,213,331	5,223,468
September	9,522,584	5,317,618	2,787,667	5,003,785
October	10,015,260	6,165,452	3,461,097	4,513,767
November	11,058,542	7,189,489	3,324,592	4,396,347
December	.....	7,806,220	3,836,643	4,282,108

Past High Prices for Pig Iron

The Matthew Addy Company, Cincinnati, in its market report under date of Dec. 9, gives the following interesting reminiscence of past high prices: "Our memories do not go back to the year 1864, but George H. Hull, who was a member of the old firm of Addy, Hull & Co. (one of the predecessors of this company), calls our attention to the fact that in the boom of that year iron advanced from $16 to $80 a ton. He writes us that consumers at that time came into our old office and deposited their money, saying, 'Give me iron at any price you can get in exchange for this money,' and then an advance of $5 per ton a week was not unusual. So, while this present market is full of sensational features, its sudden advances in price have not been without precedent. Nor have the recent advances been as great as was the case 52 years ago. Then the end of the war boomed the iron trade, while now war itself is doing the trick."

A new plant of all steel construction will be built by the Weimer Chain & Iron Company at Avon, Pa., along lines that were followed in the erection of the Weimer machine shops at Lebanon. The new plant will be 40 x 220 ft. Plans are now being drawn for the improvement. Twelve fires are now running at the company's old plant, two having been lighted this week, and its full capacity of 100 tons is being turned out.

Chester, Pa., made its second contribution to the Norwegian merchant marine when the 400-ft. steel tanker Golaa was launched at the Chester Shipbuilding Company's yard on Saturday, Nov. 25.

TO RECONSTRUCT EUROPE

American Steel Will Be Required for Some Years, According to S. A. Benner

So completely has Europe made war a business that America will be called upon to furnish the steel for Europe's reconstruction and development after the war. This is the opinion of Samuel A. Benner, European representative of the American Steel Export Company in London and Petrograd, who has just returned to this country. He says that England, Russia and France have commandeered all factories for military use and have turned all their energies from constructive work to the manufacture of ammunition.

Mr. Benner believes that for several years after the return of peace the steel capacity of the world will be insufficient to replace worn-out machinery and factories and to take up the building which was stopped by the war. All the steel going to Europe at present, he says, is being used for the manufacture of munitions of war or in extending railroads for military purposes.

The capture of many Russian mines and factories in Poland has caused a shortage of steel in Russia. The output of ingots in Russia is said to be about 50,000 to 60,000 tons a month, which is about one-half of the production before the war. Russia has mobilized 20,000,000 men and has placed her skilled laborers in munitions plants. All of the industries of the country have been mobilized to push the war to a successful conclusion.

France has lost her largest steel-producing plants to Germany, and is dependent upon her steel imports. A complete system of portable railways has been constructed behind the lines.

Steel production in England, which before the war averaged about 8,000,000 tons a year, has risen to 10,000,000 tons, Mr. Benner estimates. The exact figures could not, of course, be obtained owing to military censorship.

Railroad building is being rushed in all countries, Mr. Benner observes. Russia, in particular, has been forced to take great strides to meet the military pressure. The government controls about 80 per cent of the railroad mileage and as private charters expire it takes over other lines. About 4000 miles of double track a year is being built, principally to the new port of Alexandrovsk, which is to surpass Archangel in size. Most of the system to Vladivostok has already been double tracked.

Mr. Benner estimates that the Allies are now producing 1,000,000 tons of shells a month, including the supplies from the United States. This estimate includes Great Britain, Italy, Russia, Canada, France and Japan. He believes that there is no thought of peace in the Allied capitals. Everywhere is the preparation to pursue the war. Lloyd George's cabinet, he thinks, is determined to reverse the misfortunes of the Allies and to push the war until their desires are accomplished.

Two New Cambria Blast Furnaces

At a meeting of the directors of the Midvale Steel & Ordnance Company held last week it was decided to build two additional blast furnaces at the Johnstown, Pa., plant of the Cambria Steel Company. Both will be of large size. Both will be pushed rapidly to completion and one is expected to be ready for blowing in in May, 1917. It is the intention of the company to have one blast furnace available for the production of ferromanganese and other ferroalloys and for special irons.

One of the two blast furnaces of the Central Iron & Steel Company, Harrisburg, Pa., which have been idle since Dec. 31, 1913, will be blown in next April, and arrangements are now being made for the necessary supplies of fuel from the company's mines in West Virginia and ore from the Mohawk mine on the Mesaba range. The company also plans to place in service another 130-ton open-hearth furnace about June 1, 1917. This will increase the steel output about 30 per cent. Four open-hearth furnaces are now being operated.

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Management and Engineering Meetings

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Reserve for Mechanical Engineers

A paper which attracted much attention was "An Illustrated Review of the Development of Our Fleet and Naval Stations" by W. L. Cathcart, consulting engineer, Gwynedd Valley, Pa. In this paper the necessity for constructing a large navy, particularly capital ships and destroyers, if this country is to maintain its position among the nations of the world, was clearly brought out, and it followed as a matter of course that the berthing and repair stations must be correspondingly developed.

In the discussion which followed, the idea that the engineer must take a more prominent place in public affairs was emphasized by a number of the speakers. Rear-admiral Edwards urged the development of navy yards and said that a naval base was required on the Gulf of Mexico or at any rate somewhere along the Southern coast, since no drydocks capable of taking our large men-of-war were available there. He recommended the cutting of the naval program, if necessary, to provide the funds for the development of such a base.

Carl G. Barth, consulting engineer, Philadelphia, spoke of the way in which the shops at the navy yards were run, speaking particularly of conditions as they existed in the New York yard some eight years ago, where inefficient operation was caused, for example, by inability to get the proper speed of the shafting.

D. S. Jacobus, advisory engineer, Babcock & Wilcox Company, New York City, said that the engineer would have to take a broader stand in civic and governmental affairs. Heretofore he had stuck close to his profession but now the engineering societies would have to do more in the future, it being up to them to decide whether they should get away from engineering or form a new general society of engineers. The success of the recently conducted industrial census was commented on.

M. E. Cooley, dean of the departments of engineering and architecture, University of Michigan, Ann Arbor, Mich., spoke of the work which the engineering colleges were doing in preparing men for naval service. He had made a thorough investigation of the curricula of the engineering schools and the military and naval academies and found that apart from special military training and discipline, the engineering schools gave from 85 to 90 per cent of the work covered by the Government academies. He was in favor of attendance at military camps or participation in summer cruises to help supply the military training and discipline.

Dr. Ira N. Hollis, president, Worcester Polytechnic Institute, Worcester, Mass., said he approved thoroughly of the participation of the society in public affairs and considered it necessary to the continuance of the American Society of Mechanical Engineers as a useful part of society. Preparedness in his opinion was much more than military drill and meant general service. He suggested the formation of an engineer reserve to enable the society to do its part in time of war by releasing officers from stations on shore for active duty. This he believed would supply a connecting link between civilian and military operations which was very necessary.

HEAT TREATMENT OF LARGE CHAINS

In the paper on "Heat Treatment of Wrought Iron Chain Cable," by Naval Constructor F. G. Coburn, U. S. N., and W. W. Webster and E. L. Patch, assistant naval constructors and students at the Massachusetts Institute of Technology, the manufacture of power welded chain was gone into at some length. This it developed became necessary at the Boston Navy Yard on account of a strike of the hand chain makers in July, 1914. The properties of the iron used were touched upon and considerable information given on the heat treating and testing of the links. The conclusions brought out by the laboratory experiments were as follows:

Cooling in furnace reduces tensile strength from 49,000 to 47,000, reduces impact resistance from 150 to 90, and increases elongation and reduction of area.

Cooling in air increases tensile strength from 49,000 to 50,500, increases impact resistance from 150 to 240 and reduces elongation and reduction of area.

Quenching in oil increases tensile strength from 49,000 to 57,000, increases impact resistance from 150 to 340 and reduces elongation from 36 to 31 per cent.

Quenching in water increases strength from 49,000 to 67,000, increases impact resistance from 150 to 400 and reduces elongation from 36 to 25 per cent.

Increase of the temperature from which the material was cooled or quenched above 950 deg. C. slightly decreases tensile strength, increases elongation and reduction of area and does not appreciably affect impact resistance. Temperature of 950 deg. C. gives best results. The higher the drawing temperature, the greater the decrease in tensile strength and increase in elongation. Drawing has little effect on impact resistance. Increased time of annealing slightly decreases tensile strength and slightly increases elongation, reduction of area and impact resistance.

GAS PRODUCER FOR BITUMINOUS COAL

The first paper presented at the gas power session, held Thursday afternoon was by O. C. Berry, Purdue University, Lafayette, Ind. It covers investigations made by the author at the University of Wisconsin and afterward at Purdue on a recirculating producer in which the steam supplied for the gasification process is introduced through a steam jet blower and provides the means of circulating the gases. The question of the various forms of blowers suitable for this purpose is gone into at some length with special reference to the use of the least steam to deliver the required amount of gas, the ability of the blower to give continuous performance without clogging up or varying the delivery of the gas, freedom from excess tar precipitation, ease of access for cleaning and freedom from influence in the amount of gas delivered due to changes in the character of the fuel column. The proper temperature for the recirculated gases to precipitate the minimum amount of tar was investigated and between 550 and 900 deg. Fahr. was found to be the preferred range. The recirculating producer designed by the author is described. Among the considerations that the producer was designed to meet are simple construction, ability to stand wear, ease of poking, ready means for cleaning out clinker and ash, air and recirculated gases must enter evenly over the entire area of the bottom of the fuel column, even distribution of the steam through the air for combustion, free air circulation in all parts of the fuel column, delivery of gas from the producer so as to cause an even circulation through the upper part of the fuel column and the delivery of tar-free gas at all times.

Godfrey M. S. Tait, consulting engineer, Washington, D. C., said that the information contained in the paper would be of use to other investigators. He considers the single-zone up-draft producer with tar washing apparatus the best and cited a case where such a producer required only 15 min. per week for cleaning and oiling even though Illinois slack was used as fuel. He believes, however, that the investigation under commercial conditions should be continued.

Edward Rathbun, second vice-president, Rathbun Engineering Company, Toledo, Ohio, discussed the paper from the standpoint of an engine builder. He believed that the paper was an excellent laboratory development and showed a way toward conducting tests, but considered it limited as an aid to commercial operation. He thought that the cleanliness of the gas should have been considered after the producer was developed. He found in his experience that bituminous gas was cleaner than that produced from anthracite coal. The down-draft producer is objectionable, as it gives gases having a low heat value and thus reduces the capacity of the engine

to which it was connected, while a gas having a high heat value increased the flexibility of the engine.

H. F. Smith, secretary and general manager, Smith Gas Power Company, Lexington, Ohio, was impressed with the care with which the problems were worked out, but the process outlined had limits which should be borne in mind. He believed that a gas having a high heat value would be best for commercial work and stated that while brazing was hard with gas having a value of 120 B.t.u., it was easy where the value was 180 B.t.u.

W. B. Chapman, president, Chapman Engineering Company, New York City, considered the work in perfecting the producer creditable, as well as advancing testing. He thought that a producer using soft coal could not be depended upon to give uniform gas. The poking of a deep fire bed was difficult and he stated that the fire arched across in sizes up to 8 ft. in diameter, this fact being depended upon by the builders of mechanical producers to revolve the fire as the walls of the producer revolved. This results in the formation of cavities which if not broken down would result in the delivery of non-uniform gas. The regulation of the amount of air to the amount of gas produced was not easy and recirculation of the gases was apt to cause a drop in capacity.

SAMPLING AND ANALYZING PRODUCER GAS

The next paper, on the "Commercial Sampling and Analysis of Producer Gas," was presented by Philip W. Swain, New Haven, Conn. The paper pointed out that there were a number of ways aside from making a complete gas analysis by which the quality of producer gas could be judged more or less accurately. Low carbon dioxide, as determined by an Orsat or a recording carbon-dioxide machine, meant good gas and efficient producer operation, other indicators of gas quality being the carbon monoxide the appearance of the test flame and the reading of a recording calorimeter. In the future the standard way of determining gas quality would probably be by the use of a recording calorimeter, but at present both this instrument and the recording carbon-dioxide machines are likely to give trouble and get out of order.

A sample of the producer gas to be analyzed should be drawn from a pipe in which there was a continuous flow of fresh gas from the main, care being taken that there was no variation in pressure in the gas entering the sampling bottle. The sample must be drawn from the entire main and represent the average gas over its entire cross-section, and further should be drawn at a rate proportional to the flow of gas in the main. A two-bottle device, which the author designed for gas sampling, is described and illustrated. This permits accurate measurement and the control of the flow of water from the sampling bottle. It has a bubbling pipette for rapid absorption and can determine the carbon-dioxide by absorption or by explosion. Another form of portable instrument, which consists of an ordinary Orsat outfit which has been adapted to the analysis of producer gas, is illustrated. While the apparatus is fairly accurate, it is not as convenient and rapid in operation as one specially designed for the analysis of producer gas.

Harry F. Smith, secretary and general manager, Smith Gas Power Company, Lexington, Ohio, complimented the author on the practical way which the paper was prepared. He believed that a word of caution was necessary against using carbon-dioxide only to give a general idea of the quality of the gas. In support of his contention he cited a number of cases where, with 4 per cent of carbon-dioxide, the heating value ranged from 155 to 205 B.t.u., and with a percentage of 6.4 it ranged from 165 to 189 B.t.u. and also others where gas having a heat value of 205 B.t.u. varied in carbon-dioxide content from 4 to 13 per cent.

Another speaker stated that the subject of sampling and analysis of gas deserved more consideration from owners of producer gas plants than was given it. The personal equation was even more important in producer operation than in the operation of steam plants.

In closing the discussion the author stated that he was well aware that carbon-dioxide could not be relied upon to give a general idea of the quality of the gas. In preparing the paper, he stated, he had sent letters to a number of practical men in the gas producer field asking for their opinion on this subject, and three-quarters of them had replied that it was entirely practical to take carbon-dioxide as an indicator of the quality of the gas.

JOHN E. SWEET MEMORIAL

Memorial addresses in honor of the late Prof. John E. Sweet, founder of the society of Mechanical Engineers, were delivered Wednesday, Dec. 6, at the annual meeting of this society.

Worcester R. Warner, Warner & Swasey Company, Cleveland, gave the principal address. He referred to the letter of invitation written by Professor Sweet to Mr. Warner in 1880 to become a charter member of the society. At that time the mechanical engineer, was an indefinite personage, his profession not being included in the college curricula. Consequently, Professor Sweet had to invade the ranks of the mechanics and foremen for membership to the new society and there he found Mr. Warner.

Capt. Robert W. Hunt, Robert W. Hunt & Co., said, "Professor Sweet's life was as simple as his mechanical ideas."

Prof. Albert W. Smith, now dean of Sibley College, Cornell University, said the two typical qualities of the character of his former teacher were clearness of thought and deep human sympathy. For the would-be inventor he always carried a "needle to prick hot-air balloons," but having bursted these useless ideas he was anxious to offer constructive advice.

John H. Barr was chairman of the exercises.

England's Production of Shell Steel

That England would be entirely independent of foreign steel supplies by March, 1917, was the statement of Dr. Addison, of the British Ministry of Munitions, to a party of journalists which visited the Woolwich arsenal recently. This was made possible, he said, because of the extensions of steel plants effecting a probable saving of about £6,000,000 per year, assuming the carrying out of the present program. During the Somme offensive, he added, the expenditure of ammunition had been about 10 times the weekly rate in January, yet there were more filled shells in France now than at the beginning of the war. He thought that dilution of the working forces could not go beyond a certain point. There is essential work which can only be entrusted to the physically vigorous. The new program, he calculated, is eating up explosives in thousands of tons.

As to male labor, two new factories for explosives must need 21,000 workmen and he predicted that at least 315,000 additional men and 100,000 women workers would be necessary, if the augmented program was carried out. The control of the country's entire stock will be necessary, resulting in a greater interference than ever with private trade. He predicted that industry is going to be equipped better than ever before and that manufacturers would be more inclined than ever to adopt scientific and late methods, and that it would be essential in all extensions contemplated that the plant be up-to-date.

Mechanical Engineers Research Plans

Sub-committees on research have been appointed by the American Society of Mechanical Engineers. One of these is to consider bearing metals. Its chairman is C. H. Bierbaum of the Bierbaum-Dollar Company and vice-president of the Lumen Bearing Company, Buffalo, and the other members of the sub-committee are Prof. H. Diederichs, Sibley College, Cornell University, and John A. Capp, chief of the testing laboratories, General Electric Company, Schenectady. Another of the sub-committees is to study fuel oil, of which Prof. R. Danforth, Case School of Applied Science, Cleveland, is chairman. Sub-committees have also been appointed on flow meters, on the cutting action of machine tools, on lubrication and on worm gearing.

Iron and Steel Markets

EFFECTS OF PEACE NEWS

Price Possibilities in the Steel Market

Heavy Domestic Demand as Seen in Steel Corporation Orders

The one day that has elapsed since the surprising announcement of Germany's peace proposal has shown no traceable effects in the steel market. If actual negotiations for peace should be undertaken in the near future it is conceded that the developments in the steel industry would be highly important; but at present the trade is dominated by the belief that at this stage no basis of agreement can be found on which the war can soon be ended.

All calculations of domestic buyers and sellers of steel have long been based, not on the imminence of peace, but on the indefinite continuance of the war and the present price structure has been built up by the war. The effect on prices of actual negotiations for peace, should they come, is not overlooked in the current discussion, and until there is an actual rejection of the Berlin offer to discuss terms buying for farther future deliveries will naturally be restricted.

For months contracts between American steel manufacturers and the Allies have been drawn so as to guard against an abrupt falling off in the demand for war purposes. A stipulation in some contracts is that if shell steel is not specified the buyer shall take commercial steel in some form, as rails, plates or shapes.

Concerning the Steel Corporation's increase of over 1,000,000 tons in orders in November, it is stated on authority that out of nearly 2,500,000 tons booked in that month less than 10 per cent is to be classed as export war business. As to the proportion of the shipments from mills in recent months that should be credited to war demand estimates differ. In munitions steel and finished shells the country has probably been turning out 4,500,000 to 5,000,000 tons a year.

The German peace proposal came just as greater efforts were being put forth on behalf of Great Britain and France to get American steel. This week one sale of 30,000 tons of 82-mm. rounds is reported for delivery in the first quarter of 1917. The price was about 4½c. One or two steel companies have been negotiating for the sale of round lots of forging steel, and from Canada it is intimated that all the steel that can be furnished from this side will be taken.

That Chicago district mills contributed 500,000 tons or about half of the Steel Corporation's gain in unfilled orders last month indicates the activity of domestic buyers, particularly the railroads. Already fully 450,000 tons of rails have been sold there for delivery in the first half of 1918. An additional 20,000 tons has been taken by the St. Paul road, making its total 60,000 tons. It is expected that the Pennsylvania railroad's orders for 205,000 tons of 100-lb. to 130-lb. rails will soon be placed for 1918.

The Railroad situation in the Valley and Pittsburgh districts has gone from bad to worse. A number of blast furnaces are short of coke, due to recent embargoes, and some are likely to be forced out of blast. Shipments of finished material are also seriously hampered and the closing of some mills may be necessary if product accumulates further.

The week's advances in finished steel products have been chiefly in spikes, which have long been out of line, in tie-plates, sheets, and in iron and rail carbon bars. Some producers have put up spikes $10 a ton; Western producers with more moderation have made a $2 advance. Wire products are expected to go higher, probably $2 or $3 a ton, before Jan. 1.

It is expected that the contract price on sheet bars for the first quarter of 1917 will be fixed at close to $50. For export billets and sheet bars $60 has been paid, and a Central Western sale of ingots for domestic consumption was made at $55.

The pig iron market has lost its feverish activity and in some districts there is a marked falling off in demand. Prices have reached a level that causes buyers to hesitate. Bessemer iron for export has sold at $35, Valley furnace, and on a more limited scale of buying domestic users have paid that price. Foundry iron has advanced $1 in some markets but in other districts is unchanged.

Pittsburgh

PITTSBURGH, PA., Dec. 12, 1916.

Reports of Germany's willingness to enter into peace negotiations reached Pittsburgh at noon to-day and are the subject of much discussion in iron and steel circles. A violent break followed in the local stock market, but the reports had no effect whatever on prices of iron and steel products, which continue as strong as ever. In the past week Bessemer pig iron has advanced squarely to $35 on export and domestic sales. Prices on semi-finished steel are no higher, but very few sales are being made, as the steel cannot be obtained. Domestic ferromanganese is up about $10 per ton, sheets are slightly higher, railroad spikes are up about $10 per ton, prompt coke has sold up to $8 per ton, heavy steel scrap is up $1 to $2 per ton, and low phosphorus melting stock from $4 to $5. Another advance on wire products is expected before Jan. 1, and there may be advances on other kinds of finished material. As the close of the year approaches, the usual slight falling off in specifications on some lines is noted. The car situation is worse, and blast furnaces in the valleys and in the Pittsburgh district are suffering greatly for want of coke. It is not

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 13, 1916.	Dec. 6, 1916.	Nov. 15, 1916.	Dec. 15, 1915.
No. 2 X, Philadelphia	**$29.50**	$28.50	$25.00	$19.50
No. 2, Valley furnace	**31.00**	30.00	25.00	18.00
No. 2 Southern, Cin'ti	25.90	25.90	22.90	16.90
No. 2, Birmingham, Ala.	23.00	23.00	20.00	14.00
No. 2, furnace, Chicago*	**30.00**	28.00	26.00	18.00
Basic, del'd, eastern Pa.	30.00	30.00	26.00	18.00
Basic, Valley furnace	30.00	30.00	25.00	17.50
Bessemer, Pittsburgh	**35.95**	34.45	29.95	19.45
Malleable Bess., Ch'go*	**30.00**	28.00	26.00	18.00
Gray forge, Pittsburgh	29.95	29.95	25.95	17.95
L. S. charcoal, Chicago	31.75	31.75	25.75	19.25
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh	55.00	55.00	52.50	30.00
O.-h. billets, Pittsburgh	55.00	55.00	52.50	31.00
O.-h. sheet bars, P'gh	55.00	55.00	52.50	31.00
Forging billets, base, P'gh	80.00	80.00	76.50	52.00
O.-h. billets, Phila.	60.00	60.00	55.00	36.00
Wire rods, Pittsburgh	**70.00**	65.00	65.00	40.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	**3.159**	2.909	2.659	1.959
Iron bars, Pittsburgh	3.25	3.25	2.85	1.80
Iron bars, Chicago	2.75	2.75	2.65	1.75
Steel bars, Pittsburgh	3.00	3.00	2.75	1.80
Steel bars, New York	3.169	3.169	2.919	1.969
Tank plates, Pittsburgh	4.25	4.25	4.25	1.90
Tank plates, New York	4.419	4.419	4.419	2.169
Beams, etc., Pittsburgh	3.25	3.25	2.80	1.70
Beams, etc., New York	3.419	3.419	2.969	1.869
Skelp, grooved steel, P'gh	2.85	2.85	2.70	1.70
Skelp, sheared steel, P'gh	3.00	3.00	2.80	1.80
Steel hoops, Pittsburgh	3.25	3.25	3.10	1.90

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Dec. 13, 1916.	Dec. 6, 1916.	Nov. 15, 1916.	Dec. 15, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	**4.25**	4.00	3.65	2.50
Sheets, galv., No. 28, P'gh	**6.00**	5.50	5.25	4.75
Wire nails, Pittsburgh	3.00	3.00	2.85	2.00
Cut nails, Pittsburgh	2.95	2.95	2.80	1.90
Fence wire, base, P'gh	2.95	2.95	2.80	1.85
Barb wire galv., P'gh	3.85	3.85	3.70	2.85
Old Material, Per Gross Ton:				
Iron rails, Chicago	$29.00	$29.00	$25.00	$16.00
Iron rails, Philadelphia	**27.00**	25.00	23.00	19.00
Carwheels, Chicago	**22.00**	21.50	16.50	14.50
Carwheels, Philadelphia	22.50	22.50	18.00	15.50
Heavy steel scrap, P'gh	**27.00**	26.00	21.00	17.50
Heavy steel scrap, Phila.	24.00	24.00	19.50	15.75
Heavy steel scrap, Ch'go	23.50	23.50	20.50	15.75
No. 1 cast, Pittsburgh	**23.00**	20.50	17.00	15.25
No. 1 cast, Philadelphia	**21.00**	20.00	18.00	15.75
No. 1 cast, Ch'go (net ton)	16.50	16.50	15.50	13.75
No. 1 RR. wrot, Phila.	**27.00**	26.00	23.50	20.00
No. 1 RR. wrot, Ch'go (net)	26.00	26.00	21.00	15.25
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$7.50	$7.50	$7.50	$2.75
Furnace coke, future	4.00	4.00	3.75	2.40
Foundry coke, prompt	**8.00**	7.50	7.00	2.75
Foundry coke, future	**6.00**	5.00	5.00	3.00
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**35.50**	34.50	32.50	19.75
Electrolytic copper, N. Y.	**35.50**	34.50	32.50	19.50
Spelter, St. Louis	*11.50*	12.50	11.25	16.50
Spelter, New York	*11.75*	12.75	11.50	16.75
Lead, St. Louis	**7.80**	7.40	6.90	5.25
Lead, New York	**7.90**	7.50	7.00	5.40
Tin, New York	*43.00*	44.37½	44.12½	37.65
Antimony (Asiatic), N. Y.	14.00	14.00	13.00	39.00
Tin plate, 100-lb. box, P'gh	**$6.50**	$6.00	$6.00	$3.50

unlikely some stacks will soon blow out if coke shipments do not improve quickly.

Pig Iron.—Prices on Bessemer iron have advanced to $35, Valley furnace, no sellers quoting less than that price, while some ask $36 to $37. There have been probably half a dozen or more sales of Bessemer in lots ranging from 200 tons to 1000 tons at $35, and we also note a sale of 2500 tons of standard Bessemer for shipment to Italy at the same price. Some sellers are asking $32 for basic iron, but this has not been reached in actual sales. We note one sale of 5000 tons of basic for second quarter delivery at $30, Valley furnace. An open-hearth steel plant in the Wheeling district is understood to have closed late last week for 10,000 to 12,000 tons of basic for delivery in the second half of 1917 at about $30, Valley furnace. It is said part of the iron was secured from other districts. There have been small sales of No. 2 foundry iron at $32 to $33, Valley furnace, but the general market is $31 to $32. We quote standard Bessemer iron, $35; basic, $30 to $31; gray forge, $29; malleable Bessemer, $30, and No. 2 foundry, $31 to $32, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Ferroalloys.—In the past two or three weeks there have been heavy sales of domestic ferromanganese for delivery in the first half at $160 to $165 at furnace. Several makers, however, have advanced their price on 80 per cent to $175 at furnace. English 80 per cent is held at $160 to $164, seaboard. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year, in lots up to 100 tons, at $100; 100 tons to 600 tons, $99; and over 600 tons, $98, all per gross ton f.o.b. Pittsburgh. We now quote 9 per cent ferrosilicon at $39 to $41; 10 per cent, $40 to $42; 11 per cent, $41 to $43; 12 per cent, $42 to $44; 13 per cent, $43.50 to $45.50; 14 per cent, $45.50 to $47.50; 15 per cent, $47.50 to $49.50; and 16 per cent, $50 to $52. We quote 7 per cent silvery at $29.50 to $30; 8 per cent, $30 to $31; 9 per cent, $30.50; 10 per cent, $31; 11 per cent, $32; and 12 per cent, $33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—It is practically impossible to find semi-finished steel for sale at any price. A large Youngstown producer was in this city late last week scouring the local market for ingots, and is said to have picked up several small lots for which above $55 at shipping point was paid. The export demand for billets and sheet bars is still heavy and probably $60 could be obtained on these inquiries for base sizes and carbons, but those having the inquiries say they cannot find the steel. Prices on contracts for billets and sheet bars for first quarter delivery will be fixed about the 20th of this month, and it is said will be close to $50 at mill. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $55 to $57.50, maker's mill, Pittsburgh or Youngstown; forging billets, $80 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Plates.—Inquiry for steel cars seems to have quieted down and no important orders were placed the past week. The Phillips Sheet & Tin Plate Company has awarded 25 steel gondolas to the Pressed Steel Car Company. The Pittsburgh & Lake Erie is in the market for 500 steel hoppers, and the H. C. Frick Coke Company for 1500 mine cars. The Carnegie Steel Company will furnish the steel plates and armor plate for two battleships to be built at Newport News, and will divide with the Cambria Steel Company the plates for two ships to be built at Camden, N. J., by the New York Shipbuilding Company. The nominal price of the Carnegie Company on sheared plates remains at 3.50c. at mill, with no promise as to delivery. Several other plate mills that can ship in the second and third quarters are quoting sheared plates at 4c. to 4.50c. at mill. On small lots for fairly prompt shipment, prices range from 4.50c. to 5c. at mill, f.o.b. Pittsburgh.

Structural Material.—Some good sized jobs were placed the past week and inquiry is reported active. The American Bridge Company has taken 1300 tons of bridge work for the Pennsylvania Railroad, 2000 tons for the

Southern and 5000 tons for the Lehigh Valley. The same company took 2500 tons of steel for extensions to the plant of the Crucible Steel Company of America at Harrison, N. J. The McClintic-Marshall Company has taken 2400 tons for new steel buildings for the National-Acme Mfg. Company, Cleveland, Ohio, the Austin Company of that city having the general contract. The same fabricator took 3200 tons for a new plant for the National Malleable Castings Company. We quote beams and channels up to 15 in. at 3c. at mill, with no promise of delivery, and from 3c. to 3.25c. for second and third quarter shipment in 1917; small lots from warehouse stock, 3.50c. to 3.75c., Pittsburgh.

Steel Rails.—It is reported that the order of the Pennsylvania Railroad for 205,000 tons of standard sections is to be placed this week. Makers report the new demand for light rails active, with an advance in prices likely in the near future. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.ob.. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $38 and of open-hearth $40, per gross ton, Pittsburgh.

Sheets.—A wide range in prices is being quoted by the different mills on blue annealed, Bessemer black and galvanized sheets. It is said that several sales of carload lots of No. 28 Bessemer black sheets have been made at as high as 5c. per lb. at mill, but this is regarded as above the regular market, the sales evidently being for exceptionally prompt shipment or having some other unusual condition attached to them. The leading interest has not changed its price of 4c. on such sheets, but has practically none to sell for at least first quarter, while outside mills are quoting from 4.25c. to 5c., a fair range of the market being 4.25c. to 4.50c. The same applies to blue annealed and galvanized sheets, as much as $5 per ton difference in prices being quoted by different mills for the same gage. It is reported that galvanized sheets have sold higher than 6c. for prompt shipment. Sheets of all grades are scarce, and most mills are sold up through the first quarter and some partly through the second. We quote blue annealed sheets, Nos. 3 to 8, at 3.75c. to 4c.; box annealed, one-pass, Bessemer, cold-rolled sheets, No. 28, 4.25c. to 4.50c.; No. 28 galvanized, 5.75c. to 6.25c., and No. 28 tin mill black plate, 4.10c. to 4.25c., all f.o.b. mill, Pittsburgh.

Tin Plate.—Practically all that the mills can turn out in the first half of 1917 is under contract at $5.75 and $6 per base box, but on current orders the makers are quoting $6.50 to $7 for primes and practically the same prices for wasters. Several are quoting as high as $7.25 for wasters and $7.50 for primes for shipment from stock. We also note that a very large amount has been sold for delivery in the second half, the price to be fixed later. On terne plate, prices have been advanced by most makers from 25c. to 50c. per base box. We quote bright plate, 14 x 20, at $6 to $6.25 per base box, f.o.b. Pittsburgh, on contracts for delivery in the first half of 1917, and small lots from stock at $6.50 to $7 per base box at mill. We quote I. C. terne plate, 107 lb., at $7.15 to $7.65, and 200 lb. carrying 8-lb. coating, at $11, the usual advances applying for heavier weights and coatings.

Shafting.—Most consumers are covered through the first quarter and some of the larger ones through the first half of next year. Makers report specifications active, with prices firm, but deliveries are being made more promptly by several of the makers. It is said that the 20 per cent discount is allowed only on very attractive orders and that it may disappear entirely before long. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—There has been a sharp advance in prices on railroad spikes and track bolts. The demand for spikes is reported better while that for track bolts has been heavy for some time. We now quote track bolts with square nuts at 4.85c. to 5c. to railroads, but in Chicago and at other Western points lower prices are being named. We quote track bolts at 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. We quote railroad spikes as follows: 9/16 in. and larger, $3.40, base; 7/16 and ½ in., $3.50, base; 5/16 and ⅜ in., $3.75, base; boat spikes, $3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Makers, and the trade as well, expect another advance of $3 to $5 per ton on or before Jan. 1. The demand for wire nails and wire is still abnormally heavy, and export inquiry is also active, mostly from Canada. Mills are sold up for two or three months, and it is said wire nails for prompt shipment bring 15 to 25c. per keg advance over regular prices. Owing to the bad car situation all the mills are still much behind in deliveries. Prices in effect at this writing are as follows: Wire nails, $3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.95; galvanized wire, $3.65; galvanized barb wire and fence staples, $3.85; painted barb wire, $3.15; polished fence staples, $3.15; cement-coated nails, $2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—The new demand is still heavy, but some large makers are not selling many rods, needing practically their entire output for their own finishing mills. The demand from Canada has been active for some time, and quite large shipments are being made to that country. On a recent fairly large inquiry a local mill quoted $75 per ton for No. 5 soft rods, but has not yet obtained the order. We quote soft Bessemer, open-hearth and chain rods at $70 to $75 per gross ton, f.o.b. Pittsburgh.

Iron and Steel Bars.—Mills report the demand heavy for both iron and steel bars. The Carnegie Steel Company is understood to be practically sold up for all of 1917 on steel bars, and other large makers are about filled up for the first half. The nominal price of steel bars is 2.90c. at mill, with no promise of delivery, but makers that can ship in the latter part of the first quarter or early in the second quarter are quoting 3c. to 3.10c. at mill. The demand for reinforcing steel bars is heavy and prices are strong. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Nuts and Bolts.—Makers refer to the new demand as heavy, both from domestic and export customers, and they are about as far back in shipments as ever. Deliveries of steel bars by the mills are still bad and the shortage in cars is holding up shipments to a considerable extent. Another advance in nuts and bolts on or before Jan. 1 is expected. Discounts are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., with terms 30 days net or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 per cent; small, cut thread, 40 and 7½ per cent; large, 35 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 40 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 5 per cent; large, 30 and 5 per cent. Bolt ends, h. p. nuts 40 per cent; with c. p. nuts, 30 and 5 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, $2.60 off list, and tapped, $2.40 off; nuts, c. p. c. and t. sq., blank, $2.20 off, and tapped, $2 off; hex., blank, $2.50 off, and tapped, $2.25 off. Semi-finished hex. nuts, 60 per cent. Finished and case-hardened nuts, 60 per cent.

Rivets, 7/16 in. in diameter and smaller, 45 and 10 per cent.

Rivets.—The new demand is fairly active, but most large consumers are covered over the first quarter and

some through the first half. Export demand is also heavy. Recent shipments were made to India and Africa. Makers' prices are firm as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4.25 per 100 lb., base, and conehead boiler rivets, same sizes, $4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Cold-Rolled Strip Steel.—Nearly all consumers are covered for the first quarter on the basis of $6.50 per 100 lb. at mill, but makers state they have not yet opened their books for sales for delivery in the second half. On current orders for fairly prompt shipment, makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Hoops and Bands.—The nominal price of steel hoops remains at 3.25c. and steel bands at 2.90c., with no promise of delivery, but mills that can make shipments in the first quarter or early in the second quarter are quoting steel bands as high as 3.25c., with extras as per the steel-bar card, and steel hoops at 3.50c. at mill. Nearly all consumers are covered over the first quarter and some over the first half of next year at lower prices than are noted above.

Wrought Pipe.—The Philadelphia Company of this city has closed for about 12,000 tons of iron pipe and 8000 tons of steel pipe of various sizes, for delivery through 1917. This was divided among local, Youngstown and Wheeling mills. The Pierce-Fordyce Oil Association, operating in Oklahoma and Texas, is in the market for 100 miles of 8-in. line pipe for delivery in Healton, Okla., and Fort Worth, Tex. Most of the larger pipe mills are sold up for the first half on lap-weld sizes of iron and steel pipe, but on butt-weld sizes they can make delivery fairly promptly. Several large makers report that their orders for pipe this year will show an increase of 30 to 40 per cent over last year. Discounts in effect on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—The market is very firm and an advance in prices is looked for at any time. Mills making iron and steel tubes are largely sold up for the next six to eight months or longer, and tubes for fairly prompt shipment bring premiums over regular prices. Discounts are given on another page.

Coke.—Only about two weeks remain for blast furnaces that desire to contract for coke for the first half of next year to get under cover, and it is believed that several large contracts now pending will shortly be closed. Some furnacemen that have not covered now seem disposed to pay as high as $4 for high-grade coke for delivery over the first half, but not all producers are willing to sell at that price, believing they will get more. There is a fair demand for prompt coke. The car supply is reported slightly better, but is still far from being satisfactory. We quote best grades of furnace coke for prompt shipment at $7.50 to $8, and on contracts $4 or higher, per net ton at oven. Best grades of 72-hr. foundry coke for spot shipment are held at $8 to $8.50, and on contracts from $5 to $6.50, several makers of foundry coke having a high reputation in the trade asking the higher price. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Dec. 2, as 419,377 net tons, an increase over the previous week of 11,208 tons.

Old Material.—Dealers are predicting a famine in scrap used for steel-making purposes. Early last week sales of high-grade steel melting scrap were made at $25 and $26 per ton, but in the last day or two several large local consumers who have bought 10,000 tons or more have paid as high as $27, while $28 is reported to have been paid for part of it. There is a heavy demand for low phosphorus melting scrap, and it has sold from $35 to $36 per ton, delivered, some sellers now quoting $37. There is a moderate demand for borings and turnings. We note sales of 600 tons of turnings at $13.50 and about 1000 tons of borings at close to $15, delivered. Prices being named by dealers at this writing for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$27.00 to $28.00
No. 1 foundry cast	23.00 to 24.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	30.00 to 31.00
Hydraulic compressed sheet scrap	22.00 to 23.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	17.50 to 18.50
Bundled sheet stamping scrap	16.00 to 16.50
No. 1 railroad malleable stock	21.00 to 22.00
Railroad grate bars	13.00 to 14.00
Low phosphorus melting stock	36.00 to 37.00
Iron car axles	48.00 to 50.00
Steel car axles	48.00 to 50.00
Locomotive axles, steel	50.00 to 51.00
No. 1 busheling scrap	19.00 to 20.00
Machine shop turnings	13.00 to 14.00
Old carwheels	23.00 to 24.00
Cast-iron borings	14.50 to 15.00
*Sheet bar crop ends	29.00 to 30.00
No. 1 railroad wrought scrap	23.00 to 24.00
Heavy steel axle turnings	17.00 to 18.00
Heavy breakable cast scrap	19.00 to 20.00

*Shipping point.

Chicago

CHICAGO, ILL., Dec. 12, 1916.—(*By Wire.*)

Of the increase of 1,000,000 tons in the unfilled tonnage of the Steel Corporation, as just reported, it is estimated the Illinois Steel Company is responsible for one-half. The record-breaking sales of November could hardly be maintained through this month, and daily bookings are a little more than 50 per cent of the November average. Rail sales of 1918 now exceed the expected output for the first six months in this district, based on a gait of 70,000 tons per month, total bookings approximating 450,000 tons. Current inquiry for cars includes about 14,000, while in the past week some 2000 were bought. Among the mill products prices have been advanced $2 for spikes, $5 for tieplates, $5 to $10 for sheets, while quotations for iron and rail-carbon bars are moving upward toward 3c. at the mill. Out-of-store sheets are now $5 per ton higher. Pig iron at Chicago has advanced to $30 at the furnace and cast-iron pipe is up an additional $2. The freer offerings of dealers' scrap retarded somewhat the upward movement of prices for those grades, but railroad scrap continues to mount, with rerollers selling at $32 and iron axles in excess of $40 per ton.

(*By Mail*)

Pig Iron.—The market presents a varied assortment of inquiry, with resultant sales of a wide range in analysis and price. Buyers are generally covered through the first half, and transactions having to do with deliveries within that period are for filling-in purposes to cover additional business taken, or for the purpose of adjusting mixtures. The amount of iron from either Northern or Southern furnaces available for first-half delivery is now small, and the producers are disposed to distribute the limited quantities they have to sell rather pointedly as favors. There is also some iron to be had for delivery in December, but for this special prices are being asked. The relative scarcity of iron for first half delivery explains the willingness of some of the Southern furnaces in particular to sell in the second half at lower prices. For that delivery recent sales have been made on the basis of $23, Birmingham, with quotations ranging upward to $24. Few of the furnaces, however, are quoting openly, requiring rather that their representatives submit offers. For competitive high-phosphorus Northern iron, prices representing a spread of 50c. to $1 per ton over the Birmingham basis are being secured. Strong Northern foundry iron, malleable Bessemer and basic are held at $30 at furnace, and sales have been made at that price. For Lake Superior charcoal iron, we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which

are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 2 to 5	$31.75 to $32.75
Lake Superior charcoal, No. 1	32.25 to 33.25
Lake Superior charcoal, No. 6 and Scotch	32.75 to 33.75
Northern coke foundry, No. 1	30.50
Northern coke foundry, No. 2	30.00
Northern coke foundry, No. 3	29.50
Northern high phosphorus foundry	28.00
Southern coke No. 1 f'dry and 1 soft	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft	27.00 to 28.00
Malleable Bessemer	30.00
Basic	30.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50 to 36.00
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

Rails and Track Supplies.—Rail bookings at Chicago for 1918 now total about 450,000 tons, commitments which will fill the mills well into July of that year. A number of the important roads are still unprovided for. Tie-plates have been advanced to a minimum of $55 and sales have been made at that price, including 900 tons to the Pennsylvania Lines. Spike prices also have been adjusted and 3.50c. is now the low quotation. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, $55 to $60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Structural Material.—Outstanding car inquiry includes 1000 box for the Northern Pacific, 2500 refrigerators for the Union Pacific, 2000 gondolas and 1000 box for the Norfolk & Western, 500 coal cars and 750 gondolas for the Nickel Plate, 1000 box and 100 tank cars for the Gulf Coast Line, 1200 hoppers and 400 cabooses for the New York Central Lines, 1500 hoppers for the San Pedro, Los Angeles & Salt Lake City, 500 stock cars for the Great Northern, 500 automobile cars for the Illinois Central, 200 hoppers for the Atlantic Coast Line and a scattering of about 500 other cars in lots of 50 to 100. Orders for cars last week in the West include 1000 box for the Minneapolis & St. Louis, placed with the American Car & Foundry Company, and 500 stock cars for the same road, taken by the Haskell & Barker Car Company. The Northern Pacific placed its order for 500 automobile cars. The Minneapolis & St. Louis cars will require only about 5000 tons of steel, being almost entirely of wood construction. In building lines the week brought out no contracts of importance but inquiry from fabricators for plain material continues in surprising volume in view of the very small quantity of material available for any delivery within six months. There are now no makers of standard shapes quoting for deliveries this side of July. We quote for Chicago delivery of structural steel from mill 3.189c. to 3.439c.

We quote for Chicago delivery of structural steel out of jobbers' stocks 3.70c.

Plates.—Armour & Co., Chicago, have contracted for oil storage tanks in Texas requiring 1150 tons of plates. With practically no supply available, plate mills are daily in receipt of numerous inquiries, many of them for export. Very desirable specifications for tank plates are offered to local mills in lots up to 600 tons at 4.25c. at the mill. We quote for Chicago delivery of plates from mill, at its convenience, 3.689c.; for prompt shipment, 4.189c. to widths up to 72 in., and for wide plates, 4.939c. to 5c.

We quote for Chicago delivery of plates from jobbers' stocks, 4.35c.

Sheets.—A wide variance in the quotations being made by the mills is noted, and while there remain some few producers in a position to accept business, the general attitude indicates a wish to avoid additional obligations. Quotations as high as 4.50c. for blue annealed, 5.50c. for black and 7.50c. for galvanized are being regularly made, but the market is more properly quoted at $10 per ton below these prices. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum prices for contracts. Early shipment quotations are $5 to $10 per ton higher.

Further advances in the prices of sheets from store have been announced and we quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 4.25c.; No. 28 black, 4.75c.; No. 28 galvanized, 6.75c.

Bars.—The bar-iron mills are carefully choosing in the matter of accepting additional business and quotations are noted as high as 3c. at the mill, though 2.75c. remains the accepted market. Western makers of rail-carbon steel who are not entirely withdrawn are also asking up to 3c. We quote mill shipment, Chicago, as follows: Bar iron, 2.75c. to 3c.; soft steel bars, 3.089c. to 3.189c.; hard steel bars, 2.75c. to 3c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.60c.; bar iron, 3.60c.; reinforcing bars, 3.60c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—Existing prices appear to be no bar to new inquiry for bolts and nuts and leading manufacturers report little or no difficulty in the making of contracts on the basis of the recent advance. There also appears to have been no recurrence of the irregularities affecting the prices of rivets. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50; cut thread, 40-7½; larger sizes, 35; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-5; cut thread, 40-10-5; large size, 40; gimlet-point coach screws, 50; hot pressed nuts, square, $2.60 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to ⅜ x 4 in., 40-10-5; larger sizes, 40; carriage bolts up to ⅜ x 6 in., 40-7½; larger sizes, 35; hot pressed nuts, square, $3, and hexagon, $3 off per 100 lb.; lag screws, 50.

Cast-Iron Pipe.—New inquiry for pipe for municipal purposes is limited to the proposed purchase of 1500 to 2200 tons at St. Paul. Contracts closed last week included 1250 tons for Eveleth, Minn., awarded to the American Cast Iron Pipe Company; 1150 tons at Ann Arbor, Mich., to the National Cast Iron Pipe Company, and 600 tons at Erie, Pa., to R. D. Wood & Co. A further advance of $2 per ton has been announced in the price of pipe. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $44.50; 6-in. and larger, $41.50, with $1 extra for class A water pipe and gas pipe.

Wire Products.—The trade in wire products is without significant features, the slight falling off in business having its explanation in the normal decline at this time. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.239; wire nails, $3.189; painted barb wire, $3.339; galvanized barbed wire, $4.039; polished staples, $3.339; galvanized staples, $4.039; all Chicago.

Old Material.—The freer offering of yard scrap by the dealers is being felt in the market, and a comparison of present prices with those of a week ago shows that little advance has been made, in consequence, for these grades. The heavy scrap coming from the railroads has continued to advance. Rerolling rails are now quoted $31 to $32, prices as high as these having been paid by some of the mills, though other more favorably situated users are declining to pay over $28 except as the rails may be especially desirable. The market for heavy melting steel is temporarily quiet for lack of new buying, but prices for shoveling steel are being largely determined by offers from Pittsburgh melters. Demand for axles has reappeared and quotations are in excess of $40. Sales of foundry scrap were heavier last week and large purchases of No. 1 cast are noted. The price of stove plate still commends itself as relatively low compared with pig iron. Railroad lists last week were more in evidence as to number but of not great importance in size. The Soo Line has 1200 tons, the Big Four 3100, the Union Pacific 1200, the Santa Fé 1400, the Monon 800 and the Vandalia Lines about 400. We quote for delivery at

buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	$29.00 to $30.00
Relaying rails	32.00 to 33.00
Old carwheels	22.00 to 22.50
Old steel rails, rerolling	31.00 to 32.00
Old steel rails, less than 3 ft	26.50 to 27.00
Heavy melting steel scrap	23.50 to 24.50
Frogs, switches and guards, cut apart	24.00 to 25.00
Shoveling steel	23.00 to 23.50
Steel axle turnings	14.50 to 15.00

	Per Net Ton
Iron angles and splice bars	$29.50 to $30.00
Iron arch bars and transoms	30.00 to 30.50
Steel angle bars	22.50 to 23.00
Iron car axles	40.00 to 42.00
Steel car axles	42.00 to 43.00
No. 1 railroad wrought	26.00 to 26.50
No. 2 railroad wrought	25.00 to 25.50
Cut forge	25.00 to 25.50
Pipes and flues	16.50 to 17.00
No. 1 busheling	19.00 to 20.00
No. 2 busheling	13.75 to 14.25
Steel knuckles and couplers	23.50 to 24.50
Steel springs	24.50 to 25.00
No. 1 boilers, cut to sheets and rings	15.50 to 16.00
Boiler punchings	20.50 to 21.00
Locomotive tires, smooth	25.00 to 26.00
Machine-shop turnings	10.50 to 11.00
Cast borings	9.50 to 10.00
No. 1 cast scrap	16.50 to 17.00
Stove plate and light cast scrap	12.75 to 13.25
Grate bars	13.50 to 14.00
Brake shoes	13.50 to 14.00
Railroad malleable	18.00 to 19.00
Agricultural malleable	16.00 to 16.50

Philadelphia

PHILADELPHIA, PA., Dec. 12, 1916.

Naturally enough, the activity in pig iron is tapering off as prices go higher, but quotations continue on the upward trend. Representative brands of eastern Pennsylvania No. 2 X are held at $30, furnace. The price of basic, at $30, furnace, was confirmed in the past week by the taking of 500 tons at that figure. For a good-sized lot it is believed that over $30 would be asked. Virginia No. 2 X has sold at $30.75, the seller now quoting $31.75, with none available this side of February, but no sales have been made at the higher figure. A Pennsylvania furnace quotes $32.90, but has made no sales at the new price. It is confidently expected, however, that consumers will eventually be glad to pay these prices. Standard low phosphorus is strong at $55. The overwhelming demand for ship plates continues, with one maker quoting 6c., Pittsburgh, as his minimum. Norwegian, Italian and Japanese interests are energetic in their quest for ship steel. Steel bars are strong at unchanged quotations, but iron bars have again been advanced, the makers quoting 3.409c., Philadelphia. A mill rolling structural steel has advanced its minimum to 3.659c., Philadelphia, and is seeking no orders. Billets and sheets show renewed strength. The old material market is irregular, with heavy melting steel especially strong because of the activity and high prices prevailing at Pittsburgh. Railroad offerings last week went at prices which netted the roads more than they had received for scrap in many years.

Pig Iron.—The market is quieter, but prices have continued their progress upward, and less iron is available at any price. It is to be remembered that these are days when quotations change greatly in the course of a few hours. At some of the top prices quoted yesterday business had not been done, but sellers were confident that consumers will meet the levels they name. Competition still plays its part in the market. No large tonnages have been entered in the past week, but the aggregate of small and moderate-sized orders is good. One brand of eastern Pennsylvania No. 2 X, held last week at $29, furnace, has been advanced to $30, furnace, or $30.79, Philadelphia. For gray forge $28.79, Philadelphia, has been paid. Another brand of eastern Pennsylvania No. 2 X is held at $31, furnace, or $32.90, Philadelphia, but no sales have been made at the figure; another brand is quoted at $30, furnace, equal to $30.85, Philadelphia. A Virginia iron that was sold freely at $26.50, furnace, a week ago ($29.25, Philadelphia) brought $28, furnace, or $30.75, Philadelphia, on Saturday, and yesterday was marked up by one seller to $29, furnace, or $31.75, delivered, with none available this side of February. Still another brand of Virginia was quoted yesterday at $27.25 to $28, furnace, or $30 to $30.75, delivered. A consumer paid $30, furnace, for 500 tons of basic. The steel works and pipe shops, which are the largest purchasers in this territory, have covered their future requirements, and only appear in the market for occasional prompt lots, but it is believed that considerable first-half iron is yet to be purchased by other consumers who have not been aroused to the seriousness of the situation. One of these has inquired somewhat anxiously as to the effect of furnaces going out of blast. Standard low phosphorus is held at $55, and no signs of a halt in its upward trend are observed; indeed, the scarcity indicates higher prices. Southern No. 2 X is quoted at $25, furnace, or $30.25, Philadelphia. Export inquiries for all grades continue to come out. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$29.50 to $30.50
Eastern Pa. No. 2 plain	29.00 to 30.00
Virginia No. 2 X foundry	29.00 to 30.00
Virginia No. 2 plain	28.75 to 29.75
Gray forge	28.25 to 28.75
Basic	30.00
Standard low phosphorus	50.00

Iron Ore.—In the week ended Dec. 9 arrivals of foreign ore at this port were as follows: From Sweden, 13,021 tons; from Cuba, 12,700 tons, and from Spain, 6,195 tons.

Ferroalloys.—Prompt domestic 80 per cent ferromanganese appears to be stronger at $165, delivered. If this price were shaded at all it would be for future delivery. No prompt foreign is available and it is firmly held at $164, seaboard. Shipments from abroad are not so freely made as they were earlier in the year, and one English maker is out of the market for the first quarter. Arrivals here from England last week totaled 869 tons. The demand for miscellaneous carloads for prompt shipment is good. Spiegeleisen is held at $50 to $55, furnace. Small lots of prompt 50 per cent ferrosilicon are quoted up to $115, Pittsburgh, with carloads at $100, and 100-ton lots at $99. For blast-furnace ferrosilicon some makers ask $47, furnace, or $48.44, Philadelphia.

Plates.—The strong position of the market is indicated by the fact that in the past few days one mill received export inquiries for 54,000 to 55,000 tons of ship plates wanted by Norwegian, Italian and Japanese interests. It figured on but 10,000 tons, quoting 6c., Pittsburgh. A Norwegian buyer, in addition to the above, desired to contract for 10,000 tons a year over a period of five years, but his proposition was not considered. The mill which received these inquiries quotes ordinary tank steel at 5.159c., and ship material at 6.159c., Philadelphia. The question of another maker is 4.409, Philadelphia, on tank plates. A mill which quotes 4.659c., Philadelphia, as its minimum, took an order for 1000 tons at 4.909c., Philadelphia, delivery at its convenience. The railroads are rushing to buy.

Bars.—Steel bars range from 3.159c. to 3.409c., Philadelphia. Iron bars have again been advanced, the new quotation being 3.159c., Philadelphia, for carload lots. The demand is good and for light sizes full extras are demanded. The export demand continues.

Structural Material.—Eastern Pennsylvania makers have advanced their quotation to 3.50c., Pittsburgh, or 3.659c., Philadelphia, and with the price goes the statement that they are not looking for business, but 3.409c., Philadelphia, can still be done. The new building for the John A. Roebling's Sons Company, Trenton, N. J., which requires 2000 to 2500 tons, has been placed with the McClintic-Marshall Company. A municipal pier at the foot of Cherry Street, Philadelphia, is pending, and will require a round tonnage.

Billets.—The market is stronger than ever, with steel still scarcer for delivery in the next few months. The nominal prices are $60 for open-hearth rerolling billets and $75 to $80 for forging steel. Steel round discards are being offered at about $40 at mill.

Coke.—The situation is but little changed, with prices stiff and a source of worriment to consumers. Prompt furnace is quoted at $7.50 to $7.75 per net

ton at oven. Prompt foundry is quoted at $9 to $10. Contract furnace is nominal at $4 to $4.50 per net ton at oven. Cases have come to light where much higher prices have been asked, but consumers have not considered them. Contract foundry is nominal at $6 to $6.50 at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Sheets.—No 10 blue annealed sheets are strong at 4.409c., to 4.659c., Philadelphia, with the mills filled up for the first quarter at least.

Old Material.—Heavy melting steel has not undergone much change in this territory because of any activity therein, but it is stronger as a result of what is happening in the Pittsburgh district. Pittsburgh is reported strong at $26.50 to $27 and material is going to its mills which ordinarily would come here. For carwheels it is reported that $25, Pittsburgh, has been paid. The railroad offerings last Friday were taken to a large extent by mills at high prices. From $26 to $30 was paid for different grades. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$24.00 to $25.00
Old steel rails, rerolling	28.00 to 30.00
Low phos. heavy melting steel scrap	33.00 to 36.00
Old steel axles (for export)	45.00
Old iron axles (for export)	45.00
Old iron rails	27.00 to 28.00
Old carwheels	22.50 to 23.50
No. 1 railroad wrought	27.00 to 28.00
Wrought-iron pipe	19.00 to 20.00
No. 1 forge fire	16.50 to 17.50
Bundled sheets	16.50 to 17.50
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	13.50 to 14.00
Cast borings	14.50 to 15.00
No. 1 cast	21.00 to 22.00
Grate bars, railroad	16.00 to 16.50
Stove plate	17.00 to 17.50
Railroad malleable	18.50 to 19.00

Rogers, Brown & Co., on Dec. 15, will remove their Philadelphia branch office from the Pennsylvania Building to suite 1800 in the Morris Building.

Cleveland

CLEVELAND, OHIO, Dec. 12, 1916.

Iron Ore.—The Lake shipping season will close today, the last boats being scheduled to leave Lake Superior ports before midnight. With the close of the record-breaking season there is probably more ore on Lake Erie docks than ever before at a corresponding date. On Dec. 1 the docks held 9,958,306 gross tons, the largest amount since Dec. 1, 1912, when it totaled 10,053,836 tons. However, the dock stocks on Dec. 1 have been increased by considerable ore shipped since then. Furnaces supplied by Lake Erie docks took 90 per cent of the ore receipts direct during the season, as compared with 94 per cent last year. Late in the season considerable ore was placed on docks that would have gone direct to the furnaces had it not been for the car shortage. Some ore sales are reported, but the market is not active. A general advance of 10 per cent in wages in the mining districts will go into effect Dec. 15. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Pig Iron.—The market has quieted down considerably. While there has been no further advance in prices, they have reached such a high level that jobbing foundries are unwilling to buy pig iron until they close their castings contracts for the coming year. Sales of foundry iron for the last half in the past few weeks have been largely to manufacturers who will be in a position to add an increased cost to their products. The demand for malleable iron is less active than for foundry grades, although malleable foundries are probably fully as busy. Cleveland furnaces are quoting foundry iron at $31, or $1 per ton higher than is quoted by Valley and Toledo furnaces. The demand for Southern iron has continued quite active, many of the consumers substituting this iron for Northern because of its lower price. Scarcely any Southern iron is to be had for delivery before July 1. It is quoted at $23, Birmingham, for No. 2 for last half, but sales have been made at $25 for the second quarter. The price on Virginia foundry iron has been advanced $1 per ton, or to $28 at furnace, making the Cleveland delivered price practically the same as that of Northern iron. We quote, delivered Cleveland, as follows:

Bessemer	$35.95
Basic	30.95
Northern No. 2 foundry	$30.95 to 31.30
Southern No. 2 foundry	27.00 to 29.00
Gray forge	29.95
Ohio silvery, 8 per cent silicon	38.62 to 39.62
Standard low phos., Valley furnace	50.00 to 51.00

Coke.—The coke market shows practically no change. Foundry coke is quoted at $9.75 per net ton at oven for standard Connellsville makes, for prompt shipment, and $6.50 for contract. We note the sale of a small lot of furnace coke at $8.25 at oven.

Finished Iron and Steel.—The car shortage and railroad embargoes are tending to make deliveries worse, and steel badly wanted by consumers is held in mill yards awaiting shipment. The new demand is active, and further advances have been made by several mills for anything they have to sell for delivery during the next few months. One Pittsburgh district mill has marked its price up to 4.50c. on tank plates, 6c. on ship plates, and to a minimum of 3.25c. on steel bars and structural material. Eastern mills are quoting sheared plates at 5c. at mill; universal plates at 4c., and structural material for western shipment at 3.50c. The demand for tank plates is heavy. New structural contracts include 3400 tons for a new foundry for the National Malleable Castings Company, Cleveland, taken by the McClintic Marshall Company; 220 tons for a factory building for the Morgan Engineering Company, Alliance, Ohio, and 500 tons for a plant for the Massillon Pressed Steel Company, both taken by the Massillon Bridge & Structural Company. The Nickel Plate Railroad is in the market for 10,000 tons of rails for 1918 delivery. The demand for wire is heavy, and most consumers want considerable tonnage in addition to their regular contracts, but this is hard to find. Hard-steel bars have been further advanced to 2.90c. to 3c. at mill. Railroad spikes have been advanced to $3.40 for 4½ x 9/16 in. and larger. The sheet situation is growing worse, and consumers are now having as much difficulty in buying sheets as other finished-steel products. Sharp advances have been made in warehouse prices on black and blue annealed sheets. We quote mill prices on sheets as follows: No. 28 black, 4.25c. to 5c. at mill; No. 10 blue annealed, 3.75c. to 4.25c.; No. 28 galvanized, 6.50c. to 7.50c. Warehouse prices are as follows: Steel bars under 2 in., 3.75c.; squares and rounds, 2 in. and over, 4.25c.; structural material, 3.85c.; plates, 4.35c.; iron bars, 3.70c.; hoops, 4.50c.; blue annealed sheets, 4.50c. for No. 10; Bessemer black sheets, 4.65c. for No. 28.

Bolts, Nuts and Rivets.—A large volume of bolt and nut business is being placed in first quarter and first half contracts and specifications on contracts are heavy. Another advance is not unlikely. Rivet specifications are heavy. We quote rivets at 4.25c., Pittsburgh, for structural and 4.35c. for boiler. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 7½; larger or longer, 35. Machine bolts with h.p. nuts, ⅝ x 4, smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 5; larger or longer, 40. Lag bolts, gimlet or cone point, 50. Square and hexagon h.p. nuts, blank, $2.60 off the list; tapped, $2.40 off. C.p.c. and t. hexagon nuts, all sizes, blank, $2.50 off; tapped, $2.25 off. Cold pressed semi-finished hexagon nuts, 60 off.

Old Material.—The market continues active in steel-making scrap. Three Cleveland mills are reported to have purchased about 30,000 tons of heavy melting steel scrap from a Cleveland dealer late last week for delivery in the first quarter at $27 to $27.50 delivered, or considerably higher than the usual quotations by dealers for small lots. Prices are higher on most grades. Rerolling rails are scarce and have sold as high as $30. Cast scrap, borings and turnings, stove plate and grate bars are fairly plentiful, and prices on these show more

of a tendency to remain on their recent levels. In fact this is particularly true of turnings, which are not firm. Dealers claim that the new railroad demurrage rates will result in considerable hardship to them, especially when mills are congested. We quote, f.o.b. Cleveland, as follows:

	Per Gross Ton
Steel rails	$23.50 to $24.00
Steel rails, rerolling	28.00 to 29.00
Steel rails under 3 ft.	30.00 to 31.00
Iron rails	31.00 to 32.00
Steel car axles	50.00 to 52.00
Heavy melting steel	23.00 to 24.00
Carwheels	23.00 to 24.00
Relaying rails 50 lb. and over	37.00 to 38.00
Agricultural malleable	16.50 to 17.00
Railroad malleable	23.50 to 24.00
Steel axle turnings	17.00 to 17.50
Light bundled sheet scrap	14.50 to 15.00
	Per Net Ton
Iron car axles	$47.00 to $48.00
Cast borings	11.00 to 11.75
Iron and steel turnings and drillings	10.50 to 10.75
No. 1 busheling	18.50 to 19.00
No. 1 railroad wrought	26.00 to 27.00
No. 1 cast	19.00 to 19.50
Railroad grate bars	14.50 to 15.00
Stove plate	14.50 to 15.00

Cincinnati

CINCINNATI, OHIO, Dec. 13, 1916.—(*By Wire.*)

Pig Iron.—The scarcity of iron in the South for near-by shipment has created a price condition claimed to be unprecedented. For instance, the quotations for prompt or first half shipment are from $24 to $25, Birmingham, but for the last half $23 can be done. A number of contracts for the first half have been made at $25 and a few at the same figure for last half. Several thousand tons of Southern foundry iron was sold last week by two firms who have been holding back in quoting for last half delivery, and some of this iron went as low as $22, Birmingham, but the larger part of it was booked around $22.50 to $23. The buyers of this iron are scattered through southern and central Ohio and Indiana and one lot of 1000 tons was taken by a northern Ohio consumer. The Ohio silvery irons are more active, but no large sales are reported. For spot shipment the silvery iron furnaces are asking around $40 for an 8 per cent analysis, and contract prices range all the way from $36 to $40 at furnace. Northern basic is quiet, but one special sale was made of 2000 tons to a central Ohio melter at $30, Ironton, for first half shipment. The furnaces in that district are firm at $30 for foundry or basic for the last half, and authentic reports are circulated that an advance is contemplated for this week. Several Virginia foundry-iron contracts were made in this territory last week with prices ranging from $28 to $29 at furnace. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$26.40 to $28.40
Southern coke, No. 2 f'dry and 2 soft.	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	37.25 to 38.25
Southern Ohio coke, No. 1	31.76
Southern Ohio coke, No. 2	31.26
Southern Ohio coke, No. 3	30.76
Southern Ohio malleable Bessemer	31.26
Basic Northern	31.26
Lake Superior charcoal	28.70 to 29.70
Standard Southern carwheel	27.90 to 28.40

(*By Mail*)

Finished Material.—Both black and galvanized sheets continue advancing. Quotations of nearby mills are now on a basis of 5c., Cincinnati, or Newport, Ky., for No. 28 black sheets, and 6.90c. to 7c. for No. 28 galvanized. Quotations from some outside mills may run lower, but the question of shipment on contract time is one that the buyer is now most interested in. The mills are doing everything possible to keep their customers supplied, and so far have been reasonably successful. No. 10 blue annealed sheets, from jobbers' stocks, have been advanced to 4.40c. Other store prices are unchanged as follows: Steel bars and small structural shapes 3.70c.; structural material, 3.80c., base; rounds and squares, 2 in. and over, 4.25c.; flat bars, 1 in. and over, 4.25c.; cold rolled shafting, 10 per cent plus list. Wire nails are unchanged at $3.40 per keg, base, from stock and the demand from the hardware trade is better than at any previous year-end period. Jobbers quote barb wire at $4.40 per 100 lb. base. Stove makers complain that they are not able to obtain shipments of rivets and stove bolts on scheduled time.

Coke.—Some Wise County foundry coke was sold last week for prompt shipment at $8.75 per net ton at oven, and this is now considered a moderate price on coke urgently needed. Most foundry coke consumers are fairly well covered for the first half of next year. Contracts running through the entire year would be accepted around $5.50 to $6 in the Connellsville, Wise County and Pocahontas fields. Furnace coke is not a matter of interest except as to rushing forward shipments on contracts.

Old Material.—Not a single item in the scrap line is without an advance this week. Bundled sheet scrap went up $1 per ton and rerolling steel rails $2. Borings and turnings have also been advanced 50c. All kinds of cast scrap are much higher than 30 days ago. Even at the present figure cast scrap is not on a parity with pig iron. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

	Per Gross Ton
Bundled sheet scrap	$14.75 to $15.25
Old iron rails	25.00 to 25.50
Relaying rails, 50 lb. and up	28.50 to 29.00
Rerolling steel rails	25.00 to 25.50
Heavy melting steel scrap	21.00 to 21.50
Steel rails for melting	21.00 to 21.50
	Per Net Ton
No. 1 railroad wrought	$21.75 to $22.25
Cast borings	7.00 to 7.50
Steel turnings	7.00 to 7.50
Railroad cast	16.50 to 17.50
No. 1 machinery cast	18.25 to 18.75
Burnt scrap	10.50 to 11.00
Iron axles	33.25 to 33.75
Locomotive tires (smooth inside)	27.00 to 27.50
Pipes and flues	14.00 to 14.50
Malleable cast	15.00 to 15.50
Railroad tank and sheet	12.00 to 12.50

St. Louis

ST. LOUIS, MO., Dec. 11, 1916.

Pig Iron.—With practically all consumers covered for the first half of 1917 and probably 50 per cent covered for the last half, the market is one of interest chiefly to the consumer who has overstayed. No open quotations are being made on any brands or grades or deliveries. Among transactions may be noted one of 800 tons of No. 2 foundry and another of about 850 tons of 12 to 13 per cent Bessemer ferrosilicon which went at $48 furnace with an advance immediately thereafter to $50 per ton.

Coke.—Sales of foundry grades continue to be made for spot and early delivery at abnormal prices. One lot of about 800 tons went at $10.50 the past week, the purchase being made as much for insurance on futures delivery as because of immediate need. The figure noted was paid for Virginia product. For first half a price of $8.50 is being made, though with no important transactions.

Finished Iron and Steel.—Prices continue to be quoted in a nominal way. A Southwestern road bought 6000 tons of standard section rails for 1918 delivery. Deliveries on light rails are made in two to three months' time, the mills being in better shape on this class of material than any other. Light spikes have stiffened still more and are quoted at 3.50c., base, with advances expected with the first influence of spring track laying in heavy spikes, angle bars and bolts. New business is accepted only on 15 to 18 months' basis. Movement out of warehouse continues at capacity to handle with these prices quoted and freely paid for stock out of warehouse: Soft steel bars, 3.65c.; iron bars, 3.60c.; structural material, 3.75c.; tank plates, 4.40c.; No. 10 blue annealed sheets, 4.30c.; No. 28 black sheets, cold rolled, one pass, 4.90c.; No. 28 galvanized sheets, black sheet gage, 6.85c.

Old Material.—Mills are again paying the prices asked by the dealers and the supply is insufficient to meet requirements. Dealers are clearing up their short interests as rapidly as possible, and this still has its influence on the quotations, all grades and classes of material being affected. Open-hearth consumers are reported utilizing carwheels and cast iron wherever possible to economize on their pig-iron supplies, which they

are understood to fear will be very short the coming year in spite of their heavy purchases ahead. This arises out of the heavy business presenting itself in excess of their calculations. Lists out included 5500 tons from the Big Four, 2000 tons from the Southern Railway, 150 tons from the Cotton Belt, 1000 tons from the Union Pacific, 350 tons from the Vandalia, 200 tons from the Missouri, Kansas & Texas and 100 tons from the Missouri Pacific. Prices are marked up sharply on many items and in the present excited condition of things no predictions can be made as to the future or as to the limit of the advance. Relaying rails and iron and steel axles are altogether unobtainable. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$28.00 to $28.50
Old steel rails, rerolling	30.00 to 31.00
Old steel rails, less than 3 ft.	30.00 to 31.00
Relaying rails, standard section, subject to inspection	35.00 to 36.00
Old carwheels	22.00 to 22.50
No. 1 railroad heavy melting steel scrap	25.50 to 26.00
Heavy shoveling steel	21.50 to 22.00
Ordinary shoveling steel	18.50 to 19.00
Frogs, switches and guards cut apart	25.50 to 26.00
Ordinary bundled sheet scrap	14.50 to 15.00

Per Net Ton

Iron angle bars	$26.00 to $26.50
Steel angle bars	23.50 to 24.00
Iron car axles	37.50 to 38.00
Steel car axles	37.50 to 38.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	26.00 to 26.50
No. 2 railroad wrought	25.00 to 25.50
Railroad springs	24.50 to 25.00
Steel couplers and knuckles	25.50 to 26.00
Locomotive tires, 42 in. and over, smooth inside	28.00 to 28.50
No. 1 dealers' forge	20.00 to 20.50
Cast-iron borings	10.50 to 11.00
No. 1 busheling	19.00 to 19.50
No. 1 boilers, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast scrap	15.50 to 16.00
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	17.00 to 17.50
Agricultural malleable	14.00 to 14.50
Pipes and flues	16.50 to 17.00
Heavy railroad sheet and tank scrap	15.50 to 16.00
Railroad grate bars	13.00 to 13.50
Machine shop turnings	11.00 to 11.50
Heavy axle and tire turnings	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Dec. 11, 1916.

Pig Iron.—With barely more than 10 per cent of the productive capacity of the first half of 1917 unsold, and something like half of the last half capacity sold and with foundry stocks on Alabama yards reduced during November by 30,000 tons, the Southern iron makers will enter 1917 in a condition attended by only one embarrassment—that of satisfying their regular customers. On Friday of last week the largest foundry-iron producer, which had retired from the market a week before when the price reached $22, re-entered with its price for all deliveries in 1917 marked up to $24. The same day another company, which had re-entered a few days before, reported the sale of 15,000 to 20,000 tons for Southern delivery at $23 for the second quarter of 1917 and $22 for the last half, one lot of 1000 tons for the last half bringing $23. This interest announced its prices as $22 for last half and $23 for first half. The former figure has by this time probably disappeared. The leading producer is not doing much selling but $21 iron is still heard of in that quarter. It remains that the only two interests selling real quantities of iron quote from $22 to $24. Iron secured through brokers continues to bring as much as $25, but no furnace operator had up to the end of last week acknowledged quoting higher than $24, or selling at higher than $23. In the variance of statements and position of those seeking the spot market arises the apparent confusion as to furnace prices. In general, it may be said that, effective last Friday, consumers expecting immediate attention stood a better chance for it on a minimum of $23 than at anything below that. Republic will blow in its third furnace this week and has taken on additional iron contracts in anticipation. C. E. Buek of Chattanooga, and associates, are reported as considering the leasing of the Trussville furnace, owned by the Michigan Trust Company. The Gulf States Steel Company has an equity in the furnace, but that equity is understood to be under option by third parties seeking to lease the plant. The Buek interests have ore mines which would serve advantageously in case they take hold. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$23.50 to $25.50
No. 2 foundry and soft	23.00 to 25.00
No. 3 foundry	22.50 to 24.50
No. 4 foundry	22.25 to 24.25
Gray forge	22.00 to 24.00
Basic	23.00 to 25.00
Charcoal	25.00 to 26.00

Cast-Iron Pipe.—To the surprise of the water and gas pipe makers, specifications for renewals and for quantities of pipe that must be had come in regularly and amount to an aggregate that does not point to the diminution of foundry operations for some time to come. Reports from the field since the last raise in prices are more encouraging than was expected would be the case. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $37, 6-in. and upward, $34, with $1 added for gas pipe and special lengths.

Coal and Coke.—Steam coal brings $3 to $4 and domestic $4.50 to $6 per ton for spot consumers, of whom there is a mass owing to lack of preparedness in this respect. Coke is bringing as high as $8 and even $10 per net ton at oven, according to the customer and the seller. The Alabama Company will save all surplus coke for its own furnaces. Republic will quit serving Sloss-Sheffield, needing its coke for its own purposes. A coke famine appears to prevail. We quote standard beehive coke, f.o.b. oven, at $8 per net ton; furnace coke, $4.

Old Material.—The scrap market is very active. Steel has almost disappeared from the yards. More low grade pig iron is used as a substitute for scrap than in some time. Very little Birmingham scrap now goes outside the State. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$26.00 to $32.00
Old steel rails	17.50 to 18.00
No. 1 wrought	17.50 to 18.00
Heavy melting steel	16.50 to 17.00
No 1 machinery cast	16.00 to 16.50
Carwheels	17.00 to 18.00
Tram carwheels	16.00 to 17.00
Stove plate and light	12.00 to 12.50

New York

NEW YORK, Dec. 13, 1916.

Pig Iron.—There is less activity than was noted last week, which in turn showed a lessening of buying from the week previous. However, there is quite a little foreign business still before the trade. Domestic buyers are generally covered for the first half, and for a part of the second half. A good many furnaces are quoting high prices that are not stimulating business. Deliveries are not up to schedules, car shortages still being troublesome. Advances are not expected to be rapid or large from this point on, but winter troubles might cause scarcity in certain districts. Winter interruptions to traffic, however, bear both on the producer and the consumer so that the balance between supply and demand might not be greatly changed, taking the country through. New England foundries have provided against shortages due to traffic troubles and pig iron is still on the embargo list of the New Haven road. Buffalo furnaces have advanced their asking prices, but have no considerable inquiry. The market in that district is indeterminate. Business was done only a few days since on the $30 basis and a lower price is mentioned in connection with an Eastern transaction, but the furnaces there are now reported to be asking $35 for No. 2 X. In New Jersey a steel plant has bought some iron for the second half of 1917, variously stated at 2000 to 5000 tons. Some of this iron came from the Central West. At Elizabethport a 1000-ton sale of No. 1 and No. 3 iron is reported for second half and at Jersey City an inquiry has come out for 1000 tons for the first half. A few sales of Virginia iron have been made at $27 at furnace. We quote at tidewater for early delivery: No. 1 foundry, $30 to $31;

No. 2 X, $29.50 to $30.50; No. 2 plain, $28.50 to $29.50; Southern iron at tidewater, $29 to $30 for No. 1 and $28 to $29 for No. 2 foundry and No. 2 soft.

Ferroalloys.—A sale of 2500 tons of domestic ferromanganese by a Middle Western producer, for delivery through 1917, to a steelmaker in Wisconsin at $165, delivered, is the only large sale reported in the last week. Besides, a few lots of 60 to 100 tons each of domestic alloy have sold at the above price. Very little if any British product has been disposed of lately, the quotation for which is still $164, seaboard. The market for domestic ferromanganese is considered firmer, but outside of a recent inquiry for 1000 tons, new business is scarce. A sale of 500 tons has just been made to a foreign consumer in Italy. Spiegeleisen is quiet, the inquiries for several thousand tons reported last week not having resulted as yet in definite orders, except the sale of 500 tons to a foreign consumer. The quotation is $50 to $55, furnace, for forward delivery. Receipts in November through three of the principal Atlantic ports were about 5300 tons, and the production in the United States was about 21,000 tons. The market for 50 per cent ferrosilicon continues strong and active at $99 to $100 for future delivery with little spot material available, for which a higher price is asked.

Structural Material.—Further bridge work has been closed, including 1250 tons for the Pennsylvania, awarded to the American Bridge Company, which has also taken about 500 tons of Lehigh Valley work, most of which, as stated last week, or close to 6000 tons, was placed with the Bethlehem Steel Bridge Corporation. The Interborough Rapid Transit Company is in the market for 750 tons for four stations and an addition to the Boston Edison Company calls for close to 1200 tons. Another large letting of the week is for 750 tons for the Standard Shipbuilding Company, Staten Island, taken by the Blaw Steel Construction Company. Fabricators are not concerned over the volume of work offered, as the scarcity of labor and low average output for those employed mean that several months' work is still ahead of the shops. We quote mill shipment in two to five months at 3.419c., New York, and warehouse shipments at a minimum of 3.75c., New York.

Steel Plates.—The offer to buy shipbuilding material for a period of five years from 1917, even at a price to be established by the mill over the whole period, has found no takers, nor has the steel wanted by this Swedish buyer for 1917 been covered. There are signs that tank plates, without Lloyd specifications, are sold to be put into ships, the assumption being the builder is taking the chance that the ship would not have to change hands to the extent of requiring a Lloyd specification. A quotation of this nature appears to have been made at 4.25c. for the first quarter of 1917. No considerable amount of cars have been bought, but there are additional inquiries, including 1000 hopper cars for the Baltimore & Ohio, 1200 hopper cars for the New York Central and 100 gondola and 100 box cars for the Long Island. With the likelihood that 3.75c., Pittsburgh, quotations have practically disappeared for anything like early 1917 delivery, there is some talk now that even 5c. will obtain before very long for car plates. For ship plates 6c. is getting common and a quotation of 6.25c. on 2000 tons is noted and a refusal to consider 5000 tons at 5c. One mill with universal plates at 4c. in three or four months wants 5c. for sheared tank plates in five to six months. One boiler manufacturer, it is noted, has covered for at least 10,000 tons for last half of 1917. We quote universal and ordinary tank plates at 4.169c. to 4.669c., New York, but Lloyd specification plates at 5.169c. to 6.169c., with little available before the third quarter of 1917 and for plates in the fourth quarter of 1917 and the first quarter of 1918 at 3.669c., New York. Out of store we quote 4.75c., New York.

Bars.—It appears that in some of the late offers to buy shell steel it is agreed that in the event that shell quality of steel is ultimately not wanted soft steel may be substituted without loss of the profit involved in the shell steel transaction. Some offers of shell forging contracts for the last half are also under consideration. Here it is felt that the desire is to secure protection with plants which might otherwise dismantle their shell forging equipment and would have no protection for the raw steel. In these cases perhaps contracts might be cancelled for a consideration or specifications in the event of a cessation of hostilities might be long in coming. A number of the larger manufacturing consumers have covered for the last half of 1917. We quote mill shipments of steel bars at 3.069c. to 3.419c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, 3 mo. Bar iron is again $5 per ton higher, and we quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are 3.50c. and steel bars 3.75c., New York.

Cast-Iron Pipe.—The only public letting of importance in sight is that of Worcester, Mass., on which bids will be opened on Thursday of this week for 800 to 900 tons. Private buying has kept up well, but the time is rapidly approaching when seasonable dullness is to be expected. Pipe manufacturers have made another advance of $2 per ton, and the price of carload lots of 6-in. class B and heavier, is now $41.50 per net ton, tidewater, with class A and gas pipe taking an extra of $1 per ton.

Old Material.—Conditions continue strong, and on some commodities prices have been advanced. A particularly good demand has prevailed for heavy melting steel scrap for delivery in western Pennsylvania and for borings and turnings for blast-furnace use. For a few days prices of borings and turnings were quite close together, but in the past day or two the demand has subsided and the quotations are again on about their previous relation to one another. No. 1 railroad wrought has sold at much higher prices and the export demand is keeping up quotations on such commodities as relaying and rerolling rails and car axles. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for Eastern Pennsylvania shipment)	$21.00 to $21.50
Old steel rails (short lengths) or equivalent	22.50 to 23.00
Relaying rails	37.00 to 38.00
Rerolling rails	27.50 to 28.00
Iron and steel car axles (for export)	45.00 to 47.00
No. 1 railroad wrought	25.00 to 26.00
Wrought iron track scrap	22.50 to 23.00
No. 1 yard wrought, long	22.00 to 22.50
Light iron (nominal)	6.50 to 7.00
Cast borings (clean)	11.50 to 12.00
Machine shop turnings	11.00 to 12.00
Mixed borings and turnings	10.50 to 11.00
Wrought pipe (not galvanized or enameled)	17.00 to 17.50

The demand for cast scrap has increased decidedly. Good inquiries are in the market from large consumers. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast	$22.50 to $23.00
No. 2 cast	19.50 to 20.00
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old carwheels	21.50 to 22.00
Malleable cast (railroad)	18.00 to 18.50

British Steel Market

Export Demand for Pig Iron Active—Ferromanganese Advanced—Billets Higher

(By Cable)

LONDON, ENGLAND, Dec. 13, 1916.

Pig-iron business is restricted and the export demand is active, but restrained by permits. Tin plates are quoted at 34s. and ferromanganese at £36, with business being done for delivery on the continent. Business in semi-finished steel is difficult. Four-in. billets for first half delivery vary in quotations from $82 to $92 c.i.f. Wire rods are obtainable at £23 c.i.f. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 34s. against 32s. last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s. against £20 a week ago.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Ferromanganese, £36 against £35 a week ago.

Ferrosilicon, 50 per cent, c.i.f., £30 against £27 last week.

Iron and Industrial Stocks

NEW YORK, Dec. 13, 1916.

Values of securities were well maintained for a few days and higher prices seemed almost assured. On Friday, however, liquidation set in which became more pronounced each day. The decline in values was at first attributed to over-speculation, then it was quickened by advanced rates of interest for call loans, and finally it was greatly accelerated by peace talk coming from Germany. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	29⅝- 35¾	Int. Har. of N. J., com.	120 -125
Allis-Chal., pref..	88 - 91	Int. Har. of N. J., pref.	120 -121¾
Am. Can, com...	55 - 63⅜	Int. Har. Corp., com.	79 - 82
Am. Can, pref...	114 -114½	Int. Har. Corp., pref.	112⅝-114⅛
Am. Car & Fdy., com.	71½- 78¼	La Belle Iron, com.	89 - 94
Am. Car & Fdy., pref.	118½-119¼	Lackawanna Stl.	97¾-105⅛
Am. Loco., com..	84¼- 94	Lake Sup. Corp..	22⅛- 30⅜
Am. Loco., pref..	106⅞-107⅛	Midvale Steel....	64¼- 70
Am. Ship, com...	65½- 68	Nat. En. & Stm., com.	30 - 36½
Am. Ship, pref...	96 - 96½	Nat. En. & Stm., pref.	98¾-100½
Am. Steel Fdries.	66½- 73	N. Y. Air Brake..	155½-172
Bald. Loco., com.	73½- 81¾	Nova Scotia Stl..	141 -149
Bald. Loco., pref.	103 -107½	Pitts. Steel, pref.	103 -104
Beth. Steel, com.	599 -649	Pressed Stl., com.	77½- 85¼
Beth. Steel, pref.	150 -160	Pressed Stl., pref.	106⅛-106⅞
Cambria Steel	130	Ry. Steel Spring, com.	53½- 59¾
Carbon Stl., com.	109 -127	Ry. Steel Spring, pref.	99½-102
Case (J. I.), pref.	89¼- 89½	Republic, com. ..	79⅞- 89½
Central Fdry., com.	26 - 32	Republic, pref...	114¾-116⅛
Central Fdry., pref.	45 - 49	Sloss, com.	73 - 84
Chic. Pneu. Tool.	72½- 75½	Sloss, pref.	100
Colo. Fuel	49½- 57¾	Un. Alloy Steel..	51 - 56
Cruc. Steel, com..	75 - 87⅝	U. S. Pipe, com...	22⅞- 28⅛
Cruc. Steel, pref.	120⅛-124⅞	U. S. Pipe, pref...	65 - 66
Deere & Co., pref.	97 - 99⅞	U. S. Steel, com.	116¾-127⅛
Driggs-Seabury .	70¼- 79⅞	U. S. Steel, pref.	121 -122
Gen. Electric....	174 -183	Va. I., C. & Coke	55¼- 65
Gt. No. Ore Cert.	39½- 44⅞	Warwick	9¾
Gulf States Steel.	141 -169½	Westing. Elec....	56¼- 64¼
Gulf States Steel, 1st pref.	108 -110		
Harb-Walk. Refrac., com.	125		

Dividends

The American Steel Foundries, 1¼ per cent, payable Dec. 31.

The Standard Coupler Company, semi-annual, 1½ per cent on the common, and semi-annual, 4 per cent on the preferred stock, both payable Dec. 23.

The Electric Storage Battery Company, regular quarterly, 1 per cent on the preferred and 1 per cent on the common stock, both payable Jan. 2.

The Western Electric Company, 1½ per cent on the preferred and 2 per cent. on the common stock, both payable Dec. 30.

The American Can Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

The Ingersoll-Rand Company, regular semi-annual, 3 per cent on the preferred stock, payable Jan. 2.

The Union Switch & Signal Company, regular quarterly, $1.50 a share each on the common and preferred stock, payable Jan. 15.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

The International Harvester Company of New Jersey, regular quarterly, 1¼ per cent on the common stock, payable Jan. 15.

The General Fireproofing Company, regular quarterly, 1¾ per cent each on the common and preferred stock, payable Jan. 1.

The Standard Sanitary Mfg. Company, extra, $1 per share, payable Dec. 23.

The United Alloy Steel Corporation, initial dividend, $1 per share, payable Jan. 10.

The Baltimore Tube Company, regular quarterly on both the common and preferred stock, 1¾ per cent, payable Jan. 2.

The Chandler Motor Car Company, quarterly, 2 per cent and extra 1 per cent, payable Jan. 2.

The Charcoal Iron Company of America, 20c. per share, payable Jan. 31.

The Torrington Company, 3½ per cent on the preferred stock, payable Jan. 1.

The Willys-Overland Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

Device to Detect Critical Point in Heat-Treating Steel

Prof. R. B. Fehr, of the department of mechanical engineering of the Pennsylvania State College, State College, Pa., has recently patented an apparatus (U. S. 1,188,430) to be used in the treatment of alloy and other steel where hardening, tempering and annealing are of special importance. The new instrument is said to permit a more accurate determination of the critical point, the accurate location of which is very important in obtaining the most efficient heat treatment of steel. Careful experiments made by Professor Fehr are reported to have shown that in order to get the best results the temperature must be controlled within a few degrees and must be uniform throughout the heated parts. The device is located on the outside of the heating furnace, and the method of determining the time at which the specimen has reached the proper temperature is indicated by an electro-magnetic device which is very small and which is claimed to require no calibration in itself. The apparatus is not expensive and the operation is so simple, according to Professor Fehr, that it will probably be used by firms treating steel on an extensive scale. Professor Fehr has this to say:

> Many results that I have obtained on various carbon steels have convinced me that careful control of the temperature within a few degrees of the magnetic critical point will confer on steel properties which, in regard to magnitude, cannot be obtained by present methods of heat treating. I am not making any predictions, however, as to special alloy steels because I have not made any tests on them; nevertheless, I believe that my method will enable these steels to be treated better by establishing the Ac_2 point from which the proper heat-treating temperature can be measured by thermocouple which, as a means for measuring differences of temperature, is much more reliable than for measuring absolute temperature.

In the original patent the inventor states that he determines the proper point for heat treatment by passing a magnetic flux through the iron or steel while heating and locates the jog in the heating curve instantly, when it occurs, on an electrical indicating instrument inductively related to the magnetic lines of force threading the iron and steel.

Italian Iron and Steel Imports

Italian imports of iron and steel for the first six months of 1916 and for the same period in 1914 and 1915 are reported as follows in metric tons:

	1914	1915	1916
Scrap iron and steel	177,340	89,642	189,725
Pig iron	122,006	96,594	138,343
Steel ingots and blooms	10,997	56,575	5,953
Bars and rods	66,463	58,516	33,163
Sheets and plates	19,604	15,158	13,404
Rails	3,214	1,548	4,,852
Tin plates and coated sheets	9,166	6,378	9,713

The increased imports of scrap iron and steel and of pig iron and the decreased demand for ingots and blooms this year are the outstanding facts.

The Acme Steel Goods Company, Chicago, of which James E. MacMurray is president, has announced the institution of a profit-sharing plan for its employees. The plan is so arranged as especially to reward continuous service. A bonus of 10 per cent of the amount earned by employees who have worked continuously through the month with a loss of less than 10 hours, and a bonus of 5 per cent to employees who have lost more than 10 hours, will be paid each month.

The Canadian Steel Foundries, Ltd., Welland, Ont., has let a contract for the construction of two more open-hearth furnaces and an extension 100 ft. long to the machine shop. One new open-hearth furnace has recently been completed.

The Fort Pitt Bridge Works, Pittsburgh, has opened a Cleveland office at 612 Marshall Building, in charge of Ivor M. Williams, who formerly represented the Massillon Bridge & Structural Company in Cleveland in a similar capacity.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $70 to $75.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.95; galvanized, $3.65. Galvanized barb wire and staples, $3.85; painted, $3.15. Wire nails, $3. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement coated nails, $2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 4, 1916, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	59	32½	⅛ and ¼	48	21
½	63	48½	⅜	49	22
¾ to 3	66	52½	½	53	35
			¾ to 1½	56	40

Lap Weld

2	59	46½	1¼	42	27
2½ to 6	62	49½	1½	48	34
7 to 12	59	45½	2	49	35
13 and 14	49½	..	2½ to 4	51	38
15	47	..	4½ to 6	51	38
			7 to 12	50	37

Reamed and Drifted

1 to 3, butt	64	50½	¾ to 1½, butt	51	34
2, lap	57	44½	1¼, lap	37	21
2½ to 6, lap	60	47½	1½, lap	43	28
			2, lap	44	29
			2½ to 4, lap	47	32

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	55	37½	⅛, ¼ and ⅜	48	31
½	60	47½	½	53	40
¾ to 1½	64	51½	¾ to 1½	57	42
2 to 3	65	52½			

Lap Weld, extra strong, plain ends

2	57	45½	1¼	44	29
2½ to 4	60	48½	1½	49	35
4½ to 6	59	47½	2	51	38
7 to 8	55	41½	2½ to 4	53	41
9 to 12	50	36½	4½ to 6	52	40
			7 to 8	46	34
			9 to 12	41	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black, and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	31	1½ in.	23
1¾ and 2 in.	43	1¾ and 2 in.	35
2¼ in.	40	2¼ in.	32
2½ and 2¾ in.	46	2½ and 2¾ in.	38
3 and 3¼ in.	46	3 and 3¼ in.	43
3½ to 4½ in.	46	3½ to 4½ in.	44
5 and 6 in.	45	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets Cents per lb.

Nos. 3 to 8	3.75 to 4.00
Nos. 9 to 12	3.50 to 3.75
Nos. 13 to 16	3.60 to 3.85

No. 17 and lighter gages are based on $4 per 100 lb. for No. 28 Bessemer black sheets.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	4.05 to 4.30
Nos. 22 and 24	4.10 to 4.35
Nos. 25 and 26	4.15 to 4.40
No. 27	4.20 to 4.45
No. 28	4.25 to 4.50
No. 29	4.30 to 4.55
No. 30	4.40 to 4.65

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	4.75 to 5.25
Nos. 12 to 14	4.85 to 5.35
Nos. 15 and 16	5.00 to 5.50
Nos. 17 to 21	5.15 to 5.65
Nos. 22 and 24	5.30 to 5.80
Nos. 25 and 26	5.45 to 5.95
No. 27	5.50 to 6.00
No. 28	5.75 to 6.25
No. 29	5.90 to 6.40
No. 30	6.05 to 6.55

Tin Mill Black Plate

Nos. 15 and 16	3.90 to 4.05
Nos. 17 to 21	3.95 to 4.10
Nos. 22 to 24	4.00 to 4.15
Nos. 25 to 27	4.05 to 4.20
No. 28	4.10 to 4.25
No. 29	4.15 to 4.30
No. 30	4.15 to 4.30
Nos. 30½ and 31	4.20 to 4.35

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
Dec.	Lake	lytic	York	York	Louis	York	Louis
6	35.00	35.00	43.50	7.62½	7.50	12.62½	12.37½
7	35.00	35.00	43.62½	7.75	7.65	12.12½	11.87½
8	35.00	35.00	43.50	7.75	7.65	12.00	11.75
9	35.00	35.00	....	7.90	7.85	12.00	11.75
11	35.50	35.50	43.25	8.00	7.90	12.00	11.75
12	35.50	35.50	43.00	7.90	7.80	11.75	11.50

NEW YORK, Dec. 13, 1916.

Germany's peace move had a quieting effect on all metals, although none was really active prior to the announcement. Copper prices are strong. Tin is lower. Lead is higher with but little offered. Spelter has declined. Antimony remains unchanged as to price.

New York

Copper.—The market has been quiet but it was rendered more so by Germany's peace proposal, yet prior to it the volume of business was unquestionably restrained by the lack of prompt metal. The producers are practically sold up for the first quarter, and have under contract about 80 per cent of their second quarter production. Commitments into the third and fourth quarters cannot be called heavy. January electrolytic and Lake are quoted at 35.50c.; first quarter, 35c.; second quarter, 33.50c. to 34c.; third quarter, 32.50c. to 33c., and fourth quarter, 31.50c. to 32c. Spot is nominally around 36c., with reports of considerably higher prices, but these latter are credited to Wall Street. It is to be remembered that where desirable business in involved negotiations may effect some concession from the prices named. The exports this month, including yesterday, total 8925 tons. The London market yesterday was quoted at £168, against £170 a week ago. The market here was stirred but slightly by news it received on Monday that the British Government had again sought to restrain the advance of prices by ordering the suspension of trading in copper. All transactions are forbidden, except under special permit, and all holdings and contracts must be made known to the authorities, and the use of copper is prohibited except for government work.

Copper Averages.—The average price of Lake copper in New York for the month of November, based on daily quotations in THE IRON AGE, was 32.32c., and of electrolytic, 32.32c.

Tin.—The week has been a quiet one with the trend of prices downward, seemingly for no particular reason, except pressure to sell inspired by a desire to take profits. Spot Straits yesterday was quoted at 43c. The supply of Banca tin is practically exhausted except for a few odd lots which do not cut much of a figure. The question of securing licenses to ship from England is still bothering importers. The arrivals this month total 675 tons and there is afloat 6228 tons, most of which is due to arrive this month.

Spelter.—Quotations have continued to decline and on its face the market looks weak, but producers' representatives say that it is fundamentally as strong as ever and that January will see higher prices. Quotations show considerable variance, as, for instance, when on Monday, December, January and February sold for 11.50c., St. Louis, although another seller quoted the same positions at 12.25c. Late December and January brass mill spelter is 13c. to 13.25c. The exports this month, including yesterday, total 1606 tons. The London quotation for spot yesterday was £57 as compared with £58 10s. the week previous.

Lead.—As stated last week the leading interest advanced its New York quotation Dec. 5 to 7.50c., but it has not been selling at that figure. It is known that it will be ready to take business about Dec. 15 for January delivery at a price based on its monthly average. Meanwhile the quotations of independent producers have continued their upward march, and some have asked 8c., New York. Nearby delivery continues scarce and there are those who want the metal but cannot get it. There are intimations that speculative interests are holding lead, but this has not been confirmed. On the other hand, it is known that transportation difficulties are hampering the refineries. Yesterday small lots were offered at 7.90c., New York, but found no buyers, the peace talk having evidently made buyers timid. The St. Louis quotation yesterday was 7.80c. The exports this month, including yesterday, are small, amounting to only 51 tons. The London quotation for spot lead as compared with a week ago is unchanged at £30 10s.

Antimony.—Reports that ammunition makers are likely to buy have strengthened the market a little, although the business has not actually appeared and quotations are unchanged at 14c. to 14.50c., duty paid.

Aluminum.—The quotation for No. 1 virgin aluminum is unchanged at 63c. to 65c.

Old Metals.—The market maintains its strength. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	32.50 to 33.75
Copper, heavy and wire	30.00 to 31.50
Copper, light and bottoms	27.50 to 28.50
Brass, heavy	18.00 to 19.00
Brass, light	15.00 to 16.00
Heavy machine composition	26.00 to 26 75
No. 1 yellow rod brass turnings	19.00 to 19.50
No. 1 red brass or composition turnings	22.00 to 24.00
Lead, heavy	7.00
Lead, tea	6.50
Zinc	10.00 to 10.75

Chicago

DEC. 11.—Further advances in the price of Lake copper established by the renewal of buying by foreign interests for first quarter were a feature of the week. Tin, on the contrary, showed decided weakness. We quote: Casting copper, 33.75c.; Lake copper, 34.75c. to 35c.; tin, carloads, 43.75c., and small lots, 45.75c.; lead, 7.80c. to 8c.; spelter, 12c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 28c.; copper bottoms, 24.50c.; copper clips, 27c.; red brass, 24c.; yellow brass, 18c.; lead pipe, 6.25c.; zinc, 9c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 38c.

St. Louis

DEC. 11.—Non-ferrous metals have been rising steadily, with transactions quite large, particularly in lead and spelter. Quotations are as follows: Lead, 8c.; spelter, 11.75c. to 12c., in carload lots. In less than carload lots: Lead, 8.10c.; spelter, 14c.; tin, 49c.; Lake copper, 36c.; electrolytic copper, 35.50c.; Asiatic antimony, 16c. In the Joplin district zinc blende fell off about $5 per ton and the range was $85 to $100, with the week's average for the district $94. Calamine sold at $50 to $60, with the week's average $54. Lead ore was higher and brought $97, which is only $5.50 per ton less than the record price of last spring. The average for the district for the week was $91. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10.50c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22c.; zinc, 7c.; lead, 5.50c.; tea lead, 4c.; pewter, 25c.; tinfoil, 34c.

The U. S. Reduction Company, Chicago, with works at East Chicago, Ind., has just completed an additional building, 80 x 250 ft., three stories, and has installed three more furnaces of the latest type. These enlargements will increase the company's output approximately 24,000 lb. of aluminum every 12 hours.

Tin exports from the Straits Settlements in 1915 were 22,724 tons to the United Kingdom, 32,286 tons to the United States, and 13,778 tons to other countries. In 1914 the corresponding figures were 35,506 tons, 19,350 tons, and 11,377 tons. They were 35,215 tons, 17,735 tons, and 12,800 tons in 1913.

In October the largest quantity of radium for one month was received by the U. S. Bureau of Standards for test, the value being $77,000. The value of radium tested by the Bureau up to the present is more than $1,000,000.

The Canadian Nickel Output

The value of the nickel production of Canada in 1916 is estimated at $23,000,000 against $20,423,348 in 1915 and $13,655,381 in 1914. Ten years ago the valuation was $8,948,834 and in 1896 it was $1,188,990, but only $498,286 in 1889. In the first half of 1916, says the *Engineering and Mining Journal*, the output was 42 per cent greater than for the corresponding period in 1915.

The first and largest producer of nickel in the world is the International Nickel Company which does its refining in New Jersey but produces matte at Sudbury, Canada, through the Canadian Copper Company, which it controls. Another corporation is the Mond Nickel Company of Great Britain, of which the head is Sir Alfred Mond. This company smelts its ore at Coniston, Ontario, and the matte is refined at Clydach, Wales, the plant having been greatly enlarged in 1914. The International Nickel Company shipped 59,000,000 lb. to the United States in 1915 and the Mond Company sent 12,000,000 lb. to Great Britain. Each company uses its own process, developed after extensive experimenting and great expense.

A third corporation was organized in July, 1913—the Canadian Nickel Corporation—but the name was soon changed to the British-American Nickel Corporation. The British Government will take part of its output and the bonds will be guaranteed by that government. Undoubtedly this is part of a plan to increase the supply of nickel for the government without dependence on foreign countries. Not long ago it was announced that very soon actual operations on the building of another refinery for the British-America Company would begin and that the new refinery of the International Nickel Company at Welland, Ont., would be turning out refined metal within 12 months. The work of the British-American Company will be directed by E. P. Mathewson, who has recently left the Anaconda Copper Mining Company to associate himself with the new undertaking.

Reclaiming Zinc from Galvanized Scrap

The reclaiming of zinc from galvanized scrap by the New Jersey Chemical Company, Trenton, N. J., is referred to by the *Engineering and Mining Journal*. The process, the invention of Thomas A. Shegog, is not disclosed, but it is believed to be hydrometallurgical and the statement is made that the zinc is recovered as an oxide. Many years ago J. Richards treated galvanized scrap commercially in Philadelphia. He dissolved the zinc with dilute chlorhydric acid and crystallized zinc chloride from the solution. It is possible to precipitate zinc oxide from a solution of zinc chloride by means of magnesia, magnesium chloride being formed, from which magnesia may be regenerated. Edouard Hunebelle of Paris, France, describes a process for doing this in U. S. Patent 1,201,586, and there is some interesting chemistry in this.

The C. & G. Cooper Company, Mount Vernon, Ohio, has recently taken orders for a number of large gas engines. Among them are the following: Two 480-hp. single tandem to the American Zinc, Lead & Smelting Company, Caney, Kan.; one 960-hp. twin tandem, B. B. Stroud Company, Bradford, Pa; one 560-hp. single tandem, Charles Boldt Company, Huntington, W. Va.; three 480-hp. single tandem, Columbia Gas & Electric Company, Cincinnati; two 960-hp. twin tandem, United Fuel Gas Company, Charleston, W. Va.; one 1150-hp. twin tandem, National Carbon Company, Clarksburg, W. Va.; one 150-hp. duplex. Moores & Ross Milk Company, Columbus, Ohio, for direct driving ammonia compressor cylinders. Two Cooper 480-hp. engines have just been placed in operation in the compressor station of the Berea Pipe Line Company, Berea, Ohio.

The United Smelting & Aluminum Company, Inc., New Haven, Conn., has opened a new branch sales office in the Dime Bank Building, Detroit, Mich. Frederick Lowber, who was in charge of the company's former Detroit office in the Penobscot Building, has severed his connection with the company.

Sheet and Tin-Plate Contract Form Adopted

A new form of contract was adopted by the National Association of Sheet and Tin Plate Manufacturers on Dec. 5. "The buyer's failure to furnish specifications," it stipulates, "shall be deemed a refusal to accept the tonnage unspecified, which thereupon shall be deducted from the contract, and the buyer shall pay to the seller, as liquidated damages and not as penalty, the difference between the contract price of such material for which the buyer has failed to furnish specifications (less freight allowance, if any) and the market value thereof at the time of such failure, but such damages shall not be less than 10 per cent of said contract price."

Similarly, if the buyer has kept his part of the contract, but the seller has not made the shipments as agreed, the tonnage which the seller has failed to ship is to be deducted from the contract and the buyer may collect the difference between the contract price of such material and the market price at the time of failure to ship, such damages to be not less than 10 per cent of the contract price. Average prices quoted in THE IRON AGE and the *Iron Trade Review* are to determine the market price.

If the buyer fails to make his payments, the seller may defer further shipments or terminate the contract. The seller may require security at any time and may bring damage claims aside from the contract.

When freight rates increase or decrease after the signing of a contract, the difference shall be added to or subtracted from the price as the case may require.

Delays caused by fire, strikes, floods, casualties, car shortage, etc., may not be charged against the seller, but the buyer upon written request to the seller may deduct such remaining material as has not been shipped or is not in process of manufacture. If such accidents impair the business of the buyer the seller may likewise deduct the remaining material or hold the material for future delivery.

Chain Prices Advance

Manufacturers have again made an advance in prices of chain to the following basis:

Three-eighths-inch proof coil chain, 6c., base, per pound; 3/16-in., 10.10c.; ¼-in., 7.55c.; 5/16-in., 6.55c.; ⅜-in., 6c.; 7/16-in., 5.85c.; ½ and 9/16 in., 5.70c.; ⅝ and 11/16 in., 5.60c.; ¾ and 13/16 in., 5.50c.; ⅞ and 15/16 in., 5.40c.; 1-in., 5.30c.; 1 1/16 to 1¼ in., 5.40c. B. B. quality, 3/16 and ¼ in., $1.25 per 100 lb. over proof coil prices; 5/16 and larger, $1 advance. B. B. B. quality, 3/16 and ¼ in., $1.75 advance over proof coil, and 5/16 in. and larger, $1.50 advance. All these prices are f.o.b. Pittsburgh.

The new plant of the Standard Car Construction Company at Masury, near Sharon, Pa., of which C. H. Todd is president, is about completed, and some tank cars are already being turned out. The company is building the underframes for the cars, the tanks being secured from other sources. The plate department has not yet been started, and until it is in operation the company will build only the underframes. It will have a capacity for turning out about 10 tank cars per day, and will do other kinds of plate work except making boilers. When fully completed, the plant will employ close to 300 men.

The Trojan Electric Steel Company, Thirty-fourth Street and Hoyne Avenue, Chicago, is now manufacturing, by the electric furnace process, alloy steels to any specified analysis, cast to billet sizes. Walter E. Hadley and Eugene Guy Lilly, for the past 15 years connected with the United States Steel Corporation, are personally in charge of operations.

The M. Speer Iron & Metal Company, dealer in scrap iron and metals, has removed from the Stambaugh Building, Youngstown, Ohio, to room 310, Hamory Building, Sharon, Pa. A storage yard has also been opened at Sharon.

BRITISH STEEL EXPORTS

October Shipments Low, as Were Imports—Valuations Much Higher

British exports of iron and steel in October, made up largely of supplies sent to the Allies, were 241,261 gross tons, excluding iron ore and including scrap. This compares with 231,335 tons in September, this year, and 312,141 tons in October, 1915. The October exports are next to the lowest since February, 1915, when they were 198,804 tons. The largest exports in 1916 were 395,750 tons in May. The decided decrease in the last few months is due to the effect of government prohibitions. The average for the first 10 months of this year was 297,466 tons comparing with a monthly average in 1915 of 270,858 tons.

Pig-iron and ferroalloy exports for October were 72,187 tons against 78,973 tons in October, 1915. To Nov. 1, 1916, these shipments were 818,868 tons as compared with 450,616 tons to Nov. 1, 1915. France took 486,418 tons of pig iron and Italy 111,933 tons of this year's total.

Steel-bar exports in October were 37,976 tons (29,623 tons going to France) against 31,486 tons in September of this year and 51,658 tons in October, 1915. To Nov. 1, 1916, the total was 536,049 tons as compared with 395,305 tons to Nov. 1, 1915. France has taken 449,833 tons this year. Rail exports in October were only 6929 tons in contrast with 13,640 tons in October, 1915. The total rail exports for the first 10 months of 1916 were only 43,387 tons against 219,592 tons for the same period in 1915. Of this year's total 17,656 tons went to British India.

The galvanized sheet movement is still about 50 per cent of that of last year, the total to Nov. 1, 1916, being 113,707 tons against 257,122 tons. Tin-plate exports continue about the same as last year's. The total to Nov. 1, 1916, was 291,051 tons as compared with 312,405 tons in the same 10 months in 1915. Of the former total France took the largest amount, 59,783 tons. The October exports fell to 10,929 tons from 19,226 tons in September, this year.

October imports of iron and steel, excluding iron ore and including scrap, were small—68,065 gross tons, against 66,657 tons in September, this year, and 102,914 tons in October, 1915. The imports to Nov. 1, this year, are only three-fourths of those for the same period last year, or 768,998 tons, against 1,091,087 tons.

Blooms, billets and slabs imported in October were 12,407 tons comparing with 10,802 tons in September of this year and 27,001 tons in October, 1915. The total to Nov. 1, 1916, was only one-third of that for the same period last year, or 130,207 tons and 386,878 tons respectively. The United States contributed 106,531 tons of the former total and 312,642 tons of the latter. Steel ingot imports are large, having been 16,290 tons to Nov. 1, 1916, against 14,481 tons to Nov. 1, 1915.

Iron-ore imports continue large, those for October having been 507,023 tons against 399,724 tons in October, 1915. The total for the first 10 months of this year was 5,988,532 tons, which compares with 5,108,770 tons in the same 10 months of 1915.

The valuation of the steel exports for the first 10 months of this year is placed at £49,517,489 against £32,886,095 for the same 10 months of 1915, but this year's exports are only four-fifths of those for last year. The valuation of steel imports for the 10 months of this year is reported as £9,913,377 and for the same period in 1915 as £9,159,516. The tonnage of imports this year is only about two-thirds that for last year.

The report that the Eastern Steel Company will start up the old Anvil blast furnace at Pottstown, Pa., owned by the Pottstown Iron Company, is incorrect. The Warwick Iron & Steel Company, whose property the Eastern Steel Company leases, did at one time operate this furnace and until a few years ago had a lease on it. This lease, however, is not now in effect.

Wage Advances Become General

The Jones & Laughlin Steel Company, Pittsburgh, has announced an increase of 10 per cent in wages of all employees in its plants in Soho and South Side, Pittsburgh, and Aliquippa, Pa. The increase is effective from Dec. 15.

The Sharon Steel Hoop Company, Sharon, Pa., and the Valley Mold & Iron Company, Sharpsville, Pa., have announced an increase in wages, effective from Dec. 15.

Employees of the Harris Automatic Press Company, Niles, Ohio, who have been on strike since May 1, have voted to return to work on the original terms proposed by the company.

The Allegheny Steel Company and the West Penn Steel Company, both operating plants at Brackenridge, Pa., have given their employees a voluntary advance in wages of 10 per cent, effective from Dec. 15.

The H. B. Smith Company, Westfield, Mass., has granted over 700 of its laborers an increase in wages of 25c. a day, effective Dec. 25. The company employs 1200 hands, but those not affected by this increase are working under contracts or term agreements.

The Norton Iron Company, Ashland, Ky., has announced an increase in wages of 10 per cent, effective from Dec. 15.

The General Electric Company announces a bonus plan which will cost it about $500,000 a month, and will benefit 50,000 employees. It will pay to all employees receiving $2,500 a year or less, monthly bonuses amounting to 10 per cent of the monthly salary. This bonus is in addition to that declared by the company last summer, the first payment of which, made Aug. 1, divided $550,000 among 19,000 employees.

Notice of an increase of 10 per cent in wages for all employees, including salaried men, was posted at the plants of the Pittsburgh Steel Company, at Monessen and Glassport, Pa., Dec. 6. The higher schedule will take effect Dec. 16. About 5000 men are employed at Monessen and about 500 at Glassport. The new schedule also will apply to the employees of the Pittsburgh Steel Products Company, a subsidiary, numbering about 1500.

The steel shipbuilding yards, foundries and other metal industries in Portland, Ore., recently announced that beginning Dec. 1, employees would receive 9-hr. pay for 8-hr. work. At one or two of the largest plants, where work is particularly rushed, the men will work 9 hr. a day, receiving time and a half in pay for the last hour. The employees have now granted practically everything the union men have asked except the granting of a minimum scale and entering into a written agreement with them.

The Ohio Seamless Tube Company, Shelby, Ohio, has advanced wages 10 per cent.

The International Steel Tube & Rolling Mills, Inc., capitalized at $2,500,000, will begin the erection of a plant in Ecorse, near Detroit, Mich., within 60 days. The first tube mill is to be in operation early in the spring. H. K. Flagler, president and general manager of the company, has been active in the steel tube business for years.

It is reported from New Glasgow, N. S., that the Nova Scotia Steel & Coal Company has been asked by a large British shipbuilding company to supply its entire requirements of ship plates. Before the war these plates were secured largely from Germany because of the low price at which they were sold.

The Kentucky State Railroad Commission has fixed the rate on iron dust from Newport, Ky., to Ashland at $1.05 per ton. The Eaton-Rhodes Company, Cincinnati, had filed a complaint against the Chesapeake & Ohio Railroad, alleging overcharge. The commission ordered $223.27 refunded.

The Oregon-Washington Railroad & Navigation Company, it is announced, will expend about $5,000,000 for box cars, automobile cars and other equipment in 1917. This expenditure does not include rails or locomotives.

Pittsburgh and Nearby Districts

Stockholders of the Westinghouse Air Brake Company, Wilmerding, Pa., and the Union Switch & Signal Company, Swissvale, Pa., both near Pittsburgh, will shortly be asked to approve a plan for a merger of the two companies. If it is carried out it will involve an increase in the capital stock of the Air Brake Company from $20,000,000 to $30,000,000, and the exchange of four shares of Air Brake stock for five shares of Switch & Signal preferred stock, and two shares of Air Brake stock for three shares of Switch & Signal common. The two companies are closely allied and it is believed that by consolidating them many economies in operation would result.

Directors of the Westinghouse Electric & Mfg. Company have authorized the issuance of $15,000,000 of additional common stock to be offered to present shareholders at par in the ratio of one share of new for every four shares now held. A special meeting of stockholders will be held in East Pittsburgh, Feb. 15, to approve the new issue. Chairman Guy E. Tripp, in a circular to stockholders, says that it has been found impossible to keep pace with the growing demand so that much profitable business offered has had to be declined. To provide additional manufacturing facilities needed there has been purchased on the Delaware River at Essington, Pa., just outside of Philadelphia, a tract of land having a deep water frontage and large enough to accommodate an ultimate factory development several times as great as that of the East Pittsburgh works. It is planned to begin immediately the erection on this land of a new plant to cost between $5,000,000 and $7,000,000. The company's net income from all sources after deducting interest charges is now averaging over $1,600,000 per month. The contract for 1,800,000 rifles of Russian type being performed for the British Government by its subsidiary the New England Westinghouse Company, and which for a time presented unusual problems, is now proceeding favorably.

About Jan. 1 the Youngstown Sheet & Tube Company will have filled all the contracts for pig iron taken by the Andrews & Hitchcock Iron Company, and will then have the output of both Hubbard furnaces available for its own use. It has been taking the output of one furnace, which has been running on mill iron for some months, but will now change it over to Bessemer and will put the other Hubbard stack on Bessemer early in January. The output of both will be used in the company's own Bessemer steel plant.

The United States Horse Shoe Company, Erie, Pa., has filed notice at Harrisburg, Pa., of an increase in debt from $100,000 to $300,000.

The Pittsburgh Radium Company, recently organized at Pittsburgh, states that it has taken over the Bureau of Mines plant at Denver, Col., erected by the National Radium Institute two years ago and utilized since that time by the Bureau of Mines, in perfecting a process for treatment of American carnotite ores for their vanadium, uranium and radium content. The company has bought the plant outright and takes possession of the property Jan. 16. It will retain a number of the staff experts of the Bureau of Mines in their present positions at the plant. The acquirement of the Denver property will allow the company to begin operations at once, pending the equipment of the abandoned plant buildings purchased recently at Beaver Falls, Pa., for remodeling.

With the purchase of the plant of the former Croxton Motor Car Company, Washington, Pa., plans have been completed for its occupation by the Stungo-Radium Rubber Company, Pittsburgh. This company is incorporated under a Delaware charter with an authorized capital of $3,000,000, and will specialize in the manufacture of automobile tires. Floyd Rose, Pittsburgh, is president.

The Pittsburgh Coal Company has sold all the equipment, tugs, and colliers of its subsidiary, the Monongahela River Consolidated Coal & Coke Company, at the port of New Orleans, to the Corona Coal & Iron Company, Birmingham, Ala. The price is reported to be $600,000.

E. W. Mudge, of E. W. Mudge & Co., pig iron, steel, coal and coke factors, Frick Building, Pittsburgh, has bought the Conestoga Building, a mercantile and office structure located at Wood and Water Streets in that city. The building was erected some years ago by Capt. J. J. Vandergrift, deceased, and Mr. Mudge bought it as an investment.

The Leetsdale Foundry & Mfg. Company, Leetsdale, Pa., has been organized with a capital of $30,000, and will operate a foundry.

Parson coke breeze stokers are in use in the boiler house of the coke-oven plant of the Youngstown Sheet & Tube Company, described in THE IRON AGE of Dec. 7, and not those mentioned in the account. The Parson stoker is made by the Parson Mfg. Company, New York.

The Pittsburgh Tap Company, Pittsburgh, capital $5,000, has been incorporated by Harrison Bock, 1728 Main Street, Sharpsburg; Abram L. Wolk, 5507 Harp Street, Pittsburgh, and others.

Royersford Foundry Changes Ownership

Y. C. Freed, who was the founder and sole owner of the Royersford Foundry & Machine Company, Royersford, Pa., has disposed of his interest in the company and retired from active business. He expects to travel extensively. The company has been purchased by Frank H. Deisher of Spring City, Pa., and H. R. Willi of Williamsport, Pa. Mr. Deisher has been connected with the company as secretary for the past 11 years. Mr. Willi has been identified with a similar company at Williamsport, Pa., for 24 years. Mr. Willi will be president and general manager and Mr. Deisher, secretary and treasurer. The business of the company is that of engineer, founder and machinist and maker of punches and shears.

Locomotive Orders

Definite orders for locomotives in the first week in December amounted to 119. The Baldwin Locomotive Works will build 100 large locomotives for the Russian Government and the American Locomotive Company will furnish the Erie Railroad with 10 Pacific locomotives. It is reported but not officially confirmed that the Russian Government has placed orders with the American Locomotive Company for 66 additional locomotives, with the Baldwin Locomotive Works for 66 and with the Canadian Locomotive Company for 21. Inquiries in the week referred to were over 70, of which 40 came from the Great Northern and 30 from the St. Louis & San Francisco. The Canadian Pacific is also reported as about to inquire for a large number.

National-Acme Company's Plans Approved

Formal approval of the sale and reorganization plan of the National-Acme Mfg. Company, Cleveland, has been voted by the stockholders, and the plans as previously outlined will be carried out. The new company will be known as the National-Acme Company, an Ohio corporation, with a capital stock of $25,000,000 in shares of $50 par. Present stockholders will receive $150 in cash and five shares of the new stock for each share now held. This will give them $7,500,000 in cash and $12,500,000 in new stock for the $5,000,000 common stock now outstanding. Eastman, Dillon & Co., New York bankers, have underwritten the remaining stock. Under the terms of the transaction, the present management will remain for five years.

The Dayton Iron Company, Chattanooga, Tenn., has been incorporated with a capital stock of $500,000 by M. M. Allison, John Stagmaier, N. B. Thomasson, J. J. Lynch and others. The promoters of this company are working on plans to purchase the properties of the bankrupt Dayton Coal & Iron Company, Dayton, Tenn., and propose to renovate and put the blast furnaces in operation as soon as possible.

PERSONAL

Officers of the American Steel & Wire Company visited Birmingham and the company's mill at Fairfield, Ala., the past week. Included in the party were W. P. Palmer, president; J. S. Keefe, vice-president; Frank Baackes, vice-president and general sales agent; E. E. Stone, general purchasing agent; H. E. Baldwin, superintendent of order and warehouse department; A. F. Allen, secretary; H. A. Barren, general superintendent of blast furnaces, and others.

Albert E. Wells, professor of machine construction, Sibley College, Cornell University, will deliver Dec. 21 the next lecture in the course recently inaugurated for the employees of the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. The lecture will be on "Measuring Instruments and Systems," illustrated by lantern slides.

J. C. Maben, Sr., president; W. H. Goadby, chairman of the Executive Committee, and Theodore C. Camp and H. Parsons, directors of the Sloss-Sheffield Steel & Iron Company, have spent the past two weeks in the Birmingham district of Alabama inspecting the company's plants. It is announced that the projected building of a by-product coke oven plant awaits further consideration, but a number of other improvements will be made in the coming year.

N. B. Ford, who for 10 years traveled for the Corbin Screw Corporation from its Chicago office, having his headquarters in Kansas City, and who left some two years ago to become connected with the Ford Chain Block & Mfg. Company, Philadelphia, has re-entered the employ of the Corbin Screw Corporation as salesman, with headquarters in New Britain, Conn., and covering the territory formerly traveled by A. H. Harrop.

T. J. Bray, president Republic Iron & Steel Company, inspected the company's Alabama blast furnaces last week. He stated that the building of a by-product coke oven plant had been considered by the directors, but that the present high cost of materials and machinery was practically prohibitive.

The Standard Parts Company, Cleveland, recently organized to merge the Perfection Spring Company and the Standard Welding Company, has completed its organization by the election of Christian Girl president; F. F. Prentiss, first vice-president; Ernest W. Farr, second vice-president; P. A. Connelly, secretary, and T. E. Borton, treasurer. Messrs. Girl and Connelly were president and secretary respectively of the spring company. Six directors have been elected: Christian Girl, E. W. Farr, T. E. Borton, Chester C. Bolton and Arnold H. Goss.

Axel Sahlin of the International Construction Company, Ltd., successor to Julian Kennedy, Sahlin & Co., Ltd., 56 Kingsway, London, W. C., is at present in this country, but may sail on Saturday. He is negotiating for plates for a Swedish shipbuilder.

Samuel A. Benner, who has represented the American Steel Export Company in London and Petrograd and returned to the United States a few days ago, has been made general manager of sales of the company, with headquarters in the Woolworth Building, New York. W. H. Olthoff, the company's agent for Holland and the Dutch East Indies, recently sailed for Rotterdam.

George L. Shook, formerly of the Northern Iron Company, Port Henry, N. Y., has assumed charge of the blast-furnace department of the Central Iron & Steel Company, Harrisburg, Pa.

Herbert Chase, who has been connected with the Automobile Club of America for several years as laboratory engineer and chief engineer, has joined the office staff of the Society of Automobile Engineers in the capacity of assistant secretary. He is treasurer of the society and a member of its Council. His long service on the publication committee of the society will enable him to assume readily editorial work on its *Bulletin* and other publications.

William M. Boone, secretary of the Richard De Cou Company, Philadelphia, has severed his connection with that company, and Jan. 1 will become associated with Henry Potts & Co., 650 Real Estate Trust Building, Philadelphia. He will give his attention to structural steel and builders' cast-iron work.

A. Brice Moore has become manager of the United American Iron & Steel Company, Albany, N. Y., dealer in iron and steel scrap. He was formerly connected with John J. Caine, steel broker, New York City.

C. W. Forcier, formerly storekeeper of the Pittsburgh Railways Company, has resigned to become purchasing agent of Mackintosh, Hemphill & Co., Pittsburgh.

Meyer Davis, formerly chief engineer of the Asbestos Protected Metal Company, Pittsburgh, has been appointed manager of its San Francisco office.

William B. Anderson has been elected president of the Buckeye Iron & Brass Works Company, Dayton, Ohio, succeeding Edward G. Pease, who has retired on account of ill health, after serving the company for a number of years and will make his home in the South.

Justice Grugan, who recently resigned as manager of the Northern Ore Company's zinc operations in St. Lawrence County, N. Y., has resumed his former practice as mining engineer and has opened offices at 30 Church Street, New York. In addition to general work in examining mining and mineral properties, he will specialize in iron and the ores of tungsten, molybdenum, vanadium, etc.

John T. Boone, chief engineer for the John O. Heinze Company, Springfield, Ohio, has become chief engineer for the Disco Electric Starter Corporation, Detroit.

Alden W. Baldwin, formerly with the engineering department of the Deane Steam Pump Company at Holyoke, Mass., is now an instructor in mechanical engineering in the Towne Scientific School, University of Pennsylvania, Philadelphia.

Charles F. Quincy, chairman, Elmer M. Sperry and John F. Wallace are acting as a committee of New York engineers looking to the organization of an engineers' country club with a national membership. The location in view is at Roslyn, L. I.

Wisconsin Manufacturers Hold Annual Meeting

The Wisconsin Manufacturers' Association, at its recent annual meeting in Milwaukee, elected as president F. H. Clausson, general manager Van Brunt Mfg. Company, farm implements, Horicon, Wis. He succeeds Harry W. Bolens, president Gilson Mfg. Company, Port Washington, Wis., who served two terms. A. Hirshheimer, president LaCrosse Plow Company, LaCrosse, Wis., was elected vice-president; William George Bruce, Milwaukee, secretary; Frank J. Sensenbrenner, Neenah, Wis., treasurer, and James A. Fetterly, Milwaukee, assistant secretary-treasurer. The directors are Messrs. Clausson and Bruce; L. N. Burns, J. I. Case Plow Company, Racine, and George Ingersoll, Fairbanks, Morse & Co., Beloit, Wis. At the banquet following the meeting James A. Emery, New York, general counsel of the National Association of Manufacturers, made an address urging greater interest by business men in public affairs, particularly with respect to industrial legislation. Gov. E. L. Philipp, of Wisconsin, spoke against government ownership of railroads.

Spain's iron-ore reserves, according to estimates reported by U. S. Consul-General Carl B. Hurst of Barcelona, are 700,000,000 tons, capable of yielding about 50 per cent. of iron. The province credited with the largest deposits is Leon with 150,000,000 tons; Teruel with 135,000,000 tons, and Vizcaya with 70,000,000 tons. About 9,000,000 tons have been mined annually in the past decade, with half of it now coming from the province of Vizcaya.

Benzol and Toluol Market

Depending on the quantity involved, the price of pure benzol, for either spot or contract delivery, is 55c. to 60c. per gal. at producer's plant. The quantity available for next year's delivery has largely been sold, covered either by old contracts extending into next year or by recent new contracts covering from one to three years. There is considerable new inquiry and it is considered sufficient to absorb a large part of the new product likely to come on the market from new plants that start up early in the year, so that there is some indication of a scarcity in 1917. There is no large amount of spot benzol available and a strong market next year is looked for.

All the toluol authorized to be sold has been disposed of by contract well into the future, and there is little spot available. In fact, inquiries for contract material are going begging. It expected that there will be more to sell a little later from new plants. For domestic consumption, outside of the manufacture of munitions, some toluol is expected to be available. The quotation is $1.50 to $2 per gal., producer's plant, for toluol on contract and $2.50 per gal. for spot material.

The market for solvent naphtha is weak and spot and contract material are quoted at 25c. to 30c. per gal., producer's plant, depending on the quantity. Sales have been numerous in the last few weeks.

New Chinese Pig-Iron Producers

The Penhsihu Colliery & Iron Mining Company, in Manchuria, China, produced 3804 tons of pig iron in 1915, as reported by U. S. Consul General P. S. Heintzleman of Mukden. It is estimated that the annual output will average 36,000 tons, which will be shipped to Japan, from Darien in the winter and from Newchwang in other seasons.

The Anshanchan iron mines are to be worked under joint Chino-Japanese management under the name of the Anshanchan Chenhsing Company. The South Manchuria Railway Company will represent Japanese interests. The ore contains 40 to 60 per cent iron, but lacks uniformity. A blast furnace will be erected near the deposits and a steel plant is projected.

Holland's Iron Works in Co-operation

A co-operative society of Dutch iron works has been formed, with headquarters in Amsterdam, the main objects of which as described by U. S. Consul Frank W. Mahin of Amsterdam, Holland, are the creation and operation of bureaus for the purchase and sale of all raw materials, other materials, implements and machinery used in iron working; the maintenance of regulations as to economical conditions and the conduct of business between the members and their customers, suppliers, employees, etc.; regulating production and distribution of product; also organization and promotion of co-operative credit.

Civil service examinations for junior fuel engineer and junior mechanical engineer will be held Jan. 3 and 4 in the leading cities of the country. The Ordnance Department at Large, Springfield Armory, Mass., requires a junior mechanical engineer at a salary of $1000 per year. Practical questions in mechanical engineering will form the questionaire. Only graduates of civil, mechanical or electrical engineering colleges are eligible. The junior fuel engineer, with a salary of $1200, is required by the Bureau of Mines. Information may be obtained by addressing the United States Civil Service Commission, Washington, D. C.

The National Malleable Castings Company will build a large modern malleable foundry in Cleveland on a new site that it has acquired at East Eighty-third Street and the Belt Line Railroad. This plant will replace the company's old foundry on Platt Avenue. Considerable crane and other equipment will be required.

OBITUARY

CHARLES CLARENCE LINTHICUM, for many years professor of patent law at Northwestern University and a patent attorney of Chicago, Pittsburgh, New York and Washington, died at his home in Evanston, Ill., Dec. 12 from acute indigestion. He was patent counsel for the United States Steel Corporation and president of the Patent Law Association of Chicago. He was born in McLean County, Illinois, in 1857.

FREDERIC HOLLY REED, vice-president of J. G. White & Co., Inc., contracting engineers, 43 Exchange Place, New York, died suddenly Dec. 9 from heart disease in his home in New York City, aged 51 years. He was a civil engineer and had been active in railroad development in the Philippines. He was vice-president of the Manila Electric Railroad & Light Company.

Gen. GEORGE A. GARRETSON, Cleveland, died Dec. 8, aged 73 years. He was president of the Bank of Commerce National Association, Cleveland; chairman of the Great Lakes Towing Company, treasurer of the Montreal Iron Company, and long identified with industrial development along the Great Lakes.

CHARLES WILEY, vice-president and treasurer of John Wiley & Sons, publishers of scientific works, at 132 Fourth Avenue, New York, died Dec. 10 at his home in Orange, N. J. He was a member of the Engineers' Club and the Aldine Association, New York.

OTTO MANNESMANN, one of the brothers who founded the Mannesmann Tube Company, has been killed at Tabora, East Africa, where he was serving with the German forces against the British.

Standardizing Electrodes for Electric Furnaces

The standardization of carbon electrodes for electric furnaces in Germany has recently been accomplished and the rules were reported to go into effect Aug. 1, 1916. They are as follows:

Round carbons for steel furnaces are to be made in sizes varying in thickness from 100 mm. (4 in.) up by steps of 25 mm. (1 in.) up to 250 mm. (10 in.) diameter and by steps of 50 mm. (2 in.) for larger sizes, the tolerance varying from 3 mm to 6 mm., according to size. For rectangular electrodes used with other kinds of furnaces the standard size has been fixed at 500 mm. (about 19½ in.) square. For smaller sectional areas, required for special purposes, one of the sides is to remain at 500 mm., and the other is to be reduced by 50 mm. or multiples thereof. For electrodes used for tapping furnaces, the standard size is to be 120 mm. (say 4¾ in.) square. As regards length, the standard length may ultimately be raised to 2.4 m. (nearly 8 ft.), but for the time being was fixed at 2 m. (say 6½ ft.) for all electrodes except those used for tapping furnaces, which are to be 1.60 m. (5¼ ft.) long. All lengths, however, may be varied in multiples of 20 mm. (say 13/16 in.) and the tolerance is to be 20 mm. A table has been published giving the standard dimensions to be adopted for upper holders with cylindrical threads screwed into the carbons. The dimensions of conical threads and the standard designs for other kinds of suspensions are still under consideration.

New Installations of Heroult Furnaces

Licenses have been granted by the United States Steel Corporation for the installation of two Heroult electric steel furnaces as follows:

Atlas Crucible Steel Company, Dunkirk, N. Y., a 3-ton furnace for the manufacture of tool steel.

Crucible Steel Company of America, Harrison, N. J., a 3-ton furnace for the production of alloy steels. This is in addition to its 6-ton Heroult furnace which has been operating for some time.

These two contracts bring the number of Heroult furnaces contracted for or operating in the United States and Canada to 82.

The blast furnace of the Bessie Furnace Company, New Straitsville, Ohio, was blown in Dec. 1 on ferrosilicon after being idle for about a month for relining and repairs.

UNIFORM BOILER CODE

Conference at Washington to Further Adoption of A. S. M. E. Standards

WASHINGTON, D. C., Dec. 12, 1916.—A long stride toward the adoption of uniform laws for the manufacture and installation of boilers was taken in the past week, when a convention in this city attended by 75 delegates appointed by the governors of 28 States adopted resolutions indorsing the standard boiler code of the American Society of Mechanical Engineers. As a result of this action the legislatures of all the States will be urged to adopt a uniform law embodying the approved code and it is hoped that at an early date uniform regulations will be in force throughout the country.

The meeting held here of the American Uniform Boiler Code Congress was brought together at the instance of the Ohio Industrial Commission and was presided over by J. C. Callery, chief deputy of the Ohio Bureau of Boiler Inspection. In addition to the delegates many engineers and prominent Government officials were present, several of whom delivered addresses.

Dr. F. R. Hutton of Columbia University urged uniform State legislation, declaring that every boiler explosion added to the cost of living. The great majority of explosions, he said, could be prevented if reasonable regulations were everywhere enforced enabling manufacturers to construct boilers that would be passed by the inspection laws of all the States. Insurance is now based upon the current frequency of casualties, he said, and places a heavy burden on both the construction and maintenance of boilers. Uniform laws would lift the greater part of this burden.

Henry Hess, chairman of the Standardization Committee of the American Society of Mechanical Engineers, advocated the adoption by all the States of the boiler code of that organization, which he described at length, pointing out its advantages over the widely diversified regulations now in force in those States which attempt to exercise any control over the manufacture and maintenance of boilers. Mr. Hess emphasized the fact that at present boilers which meet all the requirements of the law in certain States cannot be used at all in other States. The general subject of boiler safety has received so little attention in some States, he said, that there are no laws whatever dealing with the matter and the public has no safeguards against the installation and maintenance of boilers so constructed that they are almost certain to explode under ordinary service conditions. Mr. Hess expressed the opinion that the adoption by the States of a uniform code standardizing boiler construction would materially reduce the cost of boilers and greatly increase the territory within which manufacturers would be able to do business.

Edward N. Hurley, chairman of the Federal Trade Commission, declared that "standardization is the foreword of business efficiency," and asserted that in no feature of industrial activity was it more important to bring about standardization than in power plants and especially in boilers. Much progress in this direction, he said, had been made through Federal legislation, but the specific objects of the Congress could not be met except by the concurrent and uniform action of the State legislatures.

Resolutions, the preamble of which stated that from 400 to 500 persons in a year are killed by boiler explosions and strongly urging the passage of State laws embodying the code of the American Society of Mechanical Engineers, were unanimously adopted. A committee will take up the matter of drafting a uniform bill for introduction in the State legislatures and the co-operation of power users in all branches of industry will be sought to secure early action.

W. L. C.

The United Alloys Steel Corporation, Canton, Ohio, placed its 35-in. blooming mill in its new plant B in operation Dec. 5 and will shortly start up its 18-in. sheet-bar and billet mill.

Steel Manufacturers to Co-operate with Engineers' Boiler Code Work

American steel manufacturers are to work closely with the Boiler Code Committee of the American Society of Mechanical Engineers as the result of a petition presented at the public hearing held by the code committee in the Engineering Societies Building, New York, on Friday, Dec. 8. Through C. F. W. Rys, metallurgical engineer Carnegie Steel Company, Pittsburgh, the Association of American Steel Manufacturers asked that a committee of that association serve with a committee selected by the Boiler Code Committee. As a result of the suggestion Dr. D. S. Jacobus, advisory engineer Babcock & Wilcox Company, S. F. Jeter, Hartford Steam Boiler Inspection & Insurance Company, and William F. Kiesel, Jr., assisant mechanical engineer Pennsylvania Railroad, were appointed to represent the Boiler Code Committee, and Mr. Rys, F. J. Cole, chief consulting engineer American Locomotive Company, Schenectady, and C. D. Young, engineer of tests Pennsylvania Railroad, Altoona, represent the manufacturers' association.

At the hearing, Mr. Rys argued for the elimination of the copper content limit specified in firebox steel for boilers and mentioned the desirability of changes in bending tests, now under consideration by the American Society for Testing Materials and the steel manufacturers.

Mr. Young endorsed a 10,000-lb. range in the tensile strength for firebox steel against the 55,000 to 63,000 lb. range of the existing specifications, stating that the boiler code's specification was the only one in existence with this shorter range. The Boiler Tube Manufacturers of America put in a number of suggestions, asking for a manganese range of steel tubes of 0.30 to 0.60 per cent, instead of 0.30 to 0.50 per cent, and covering also flange tests and workmanship.

United States Shell Bids and Awards

The chief of the Bureau of Ordnance, Navy Department, Washington, will receive proposals until noon Jan. 3, 1917, for furnishing the following projectiles: 7200 16-in. armor-piercing shells; 8100 14-in. armor-piercing and 900 14-in. class B shells.

An award has been made to the Midvale Steel Company, Philadelphia, by the chief of the Bureau of Ordnance, Washington, for furnishing 1200 12-in. deck-piercing shells. Bids for this material were opened Aug. 29.

The following bids were received by the commanding officer, Frankford Arsenal, Nov. 7, under proposal 210, for furnishing 98,287 shrapnel cases for 4.7-in. shrapnel: The Hydraulic Pressed Steel Company and the Metal Products Company (combined bid), $8.53 each, accepted. The Bethlehem Steel Company, $9.47 each. The Bridgeport Projectile Company, $9.75 each. The Worthington Pump & Machinery Corporation, $10.50 each.

French War Steel Output

An arrangement has been made by the French Government concerning the output of steel in France, for the utilization of all minerals for the state and the immediate development of all potential resources. A committee has been formed in Cherbourg to superintend the re-opening of the Dielette mine of which the Germans had obtained control before the war broke out. About 20,000 tons of iron ore has been brought to the surface ready for use, while 50,000 tons more is ready for removal. The Dielette mine, according to Herr Thyssen's engineers, was to have produced at least 100,000 tons a year of ore averaging 56 per cent iron. It is the only high grade magnetic oxide found in France.

Bertsch & Co., Cambridge City, Ind., have shipped to a customer at Canton, Ohio, a shearing machine weighing 50 tons, having a 17-ft. stroke, capable of cutting ¼-in. steel plates. This is the longest blade the firm has thus far constructed.

First Year of the American International Corporation

President Charles A. Stone of the American International Corporation presented to its stockholders at the annual meeting Dec. 6 a report covering its first year's activities. In that time 1230 propositions were submitted to the corporation for consideration, 29 of these coming from Africa, 73 from Asia, including 45 from China; 41 from Canada, 47 from Central America, 347 from South America, 326 from the United States and 256 from Europe outside of the countries of the Teutonic allies. Reference is made to the taking over control of the Pacific Mail Steamship Company, acquiring all the stock of the Allied Machinery Company of America, acquiring an interest in the International Mercantile Marine Company, also in the United Fruit Company and other corporations. In connection with getting control of the New York Shipbuilding Company, Camden, N. J., it is announced that the facilities of this yard will be extended materially. Contracts for ships under construction amount to $20,000,000, besides $22,900,000 for two battleships to be built for the Government. The American International Terminals Company has been organized to study terminal problems at New York and ultimately to develop an organization for the construction of terminals, port works and harbor facilities in other places.

The American International Corporation is jointly interested with Stone & Webster in the Latin-American Corporation, which will undertake South American development under the direction of W. S. Kies of the National City Bank. Important work has been started in Russia under the direction of Frederick Holbrook. After nearly a year in Russia, Mr. Holbrook came to New York to perfect a Russian organization and on Sept. 20 returned to Russia in company with a number of experts to investigate railroad, steel and coal enterprises. The corporation is now filling orders from the Russian Government for a large amount of steel rails and other railroad equipment. It has advanced $500,000 to China to be expended by the government on surveys for railroads to be built under contract with the American International Corporation. Willard D. Straight, a vice-president of the corporation, gives particular attention to Far Eastern matters.

The German Steel Trade

The statement of the German Steel Works Union issued at its regular meeting, Oct. 26, 1916, had the following to say regarding the condition of the German steel trade:

In semi-finished steel the domestic demand exceeds the output and deliveries to neutral countries are suspended. Orders for railroad material from the collieries and from the military authorities for mine and portable rails are considerable. Deliveries to neutral countries of both heavy and light material are still suspended. The demand for shapes from the army authorities has increased and only small quantities are available for merchants. Demand from neutral countries is very keen, but in most cases it cannot be met.

Germany's steel output in September was 1,393,434 metric tons, or 53,594 tons per day, against 1,414,097 tons or 52,374 tons per day in August. In September, 1915, it was 1,174,350 tons. The war record was 54,990 tons per day in June, this year, and the largest month was 1,414,097 tons in August. The September output was made up of 670,646 tons of Bessemer ingots, 585,713 tons of open-hearth ingots, 109,639 tons of steel castings, 9961 tons of crucible steel and 17,475 tons of electric steel. This last is the largest month's output ever recorded, the electric steel produced in August having been 17,093 tons. The steel output for the first nine months of this year was 11,930,000 tons, against 9,673,000 and 12,225,000 tons in the same periods of 1915 and 1914 respectively. The steel output from January to September, inclusive, was only 3 per cent below that of 1914, which included seven months of peace.

Russian exports of manganese in the first six months of this year were less than 50 tons, as against none to July 1, 1915, and 633,825 tons to July 1, 1914.

BIGGEST SHIPBUILDING MONTH

November Total of Completed Vessels, 100 of 90,636 Gross Tons

WASHINGTON, D. C., Dec. 12, 1916.—American shipyards in November completed 100 vessels of 90,636 gross tons, thereby breaking all records for a single month in the history of the industry. All of these ships were officially numbered for the American flag except two steamers of 7847 gross tons for Norwegian owners. There were also built and officially numbered during the month 9 yachts aggregating 237 gross tons. November's output brings the production of American shipyards for the 11 months of the calendar year 1916 up to 1115 vessels aggregating 522,083 tons, a figure materially in excess of the record for this period in any year.

The following table shows the distribution of the month's construction by material and rig:

	No.	Gross Tons
Wood:		
Sailing	4	2,168
Steam	8	1,959
Gas	29	1,749
Unrigged	31	8,962
	72	14,838
Metal:		
Sailing	..	.....
Steam	19	59,238
Gas	5	7,257
Unrigged	2	1,219
	26	67,714
Totals:		
Sailing	4	2,168
Steam	27	61,197
Gas	34	9,006
Unrigged	33	10,181
Grand total	98	82,552

Atlantic and Gulf shipyards constructed more than one-half the November output, completing 57 vessels of 48,476 gross tons, of which 9 aggregating 35,605 tons were of steel and 48 aggregating 12,871 tons were of wood. The output of the Pacific yards included 10 vessels, aggregating 4427 gross tons, of which 1 vessel of 3820 tons was of steel and 9 aggregating 607 tons were of wood. The yards on the Great Lakes turned out 18 vessels of 28,757 tons, of which 15 of 28,280 tons were of steel and 3 aggregating 477 tons were of wood. Thirteen vessels, aggregating 892 tons, were built on the Western rivers, 1 of 9 tons being of steel and 12, aggregating 883 tons, of wood. Of the 2 vessels built for Norwegian owners 1 was of 5729 tons and the other of 2118 tons.

During November 39 American vessels, aggregating 29,809 tons, were transferred to foreign flags, these vessels ranging from small gas yachts of 9 tons to steel steamers of 2667 tons each. Since July 1, 1916, returns show the sale of 87 American vessels of 106,689 gross tons to foreigners, of which 40,601 were sold to Norwegians, 19,689 to French, 11,276 to Japanese, 11,140 to Uruguayans, 7955 to Dutch, 7370 to British, 2357 to Nicaraguans, 1393 to Spanish, 1083 to Cubans, 974 to Russians, 962 to Portuguese, 838 to Danish, 366 to Venezuelans, 232 to Dominicans, 222 to Mexicans, 203 to Costa Ricans, and 28 to other foreigners.

W. L. C.

A Small Steel Plant in Chile

Steel manufacture on a small scale has recently been started at Santiago, Chile, as reported by U. S. Commercial Attaché V. L. Havens. The raw material is scrap formerly exported to Europe. The high price of steel due to the war led to the building of the plant through the efforts of an engineer, Mateo Vucetich, and a capitalist, Bernado Granello. It was difficult at first to find skilled workmen, but Spaniards were finally secured from Bilbao. Chileans were made apprentices and the force now employed is 100. A special foundry had to be built to make the necessary machinery. Chilean coal is being used. The products include bars, plates, angles, tees, steel for concrete, bolts, nuts, nails, horseshoes, tires, etc. The Chilean steel sells for 20 per cent less than the imported and the demand is large.

MUNITIONS AT PRIVATE WORKS

Government Co-operation with Manufacturers—Scientific Management Again

WASHINGTON, D. C., Dec. 12, 1916.—Urgent recommendations that favorably located and well equipped private plants for the manufacture of munitions, which have been developed in this country as the result of the European war, should not be permitted to be dismantled, but rather should be preserved for co-operation with the Government in any emergency, are contained in the annual report of Secretary of War Newton D. Baker. The Secretary also devotes considerable space to a discussion of the conditions in the Government arsenals brought about by the legislation forbidding the further use of scientific shop management systems and deplores the fact that the Government can no longer secure maximum production with a minimum cost and cannot properly reward zeal and superior workmanship on the part of its employees.

ORDERS FOR PRIVATE PLANTS

Under former laws, the Secretary says, the Federal Government in time of war would have to enter the markets of the country to obtain munitions, arms and other supplies on the same basis as an individual; but legislation enacted at the last session of Congress authorizes the President in time of war "to exercise a power analagous to that of eminent domain over the various manufacturing plants in the country and gives Government orders precedence over all private orders." Authority was also given to the Ordnance Department to prepare in time of peace the necessary gages, jigs, dies and other special tools required in the manufacture of arms and ammuntion, and to give to specially equipped manufacturers educational orders, which, while limited in amount, will insure private manufacturers having the necessary experience and force to enter rapidly upon the manufacture of munitions in the event of necessity. Congress authorized the appointment of a board to study and report to Congress upon the advisability of exclusive Government manufacture of war materials. This board has been appointed and is proceeding with its investigation. No forecast can as yet be given of the conclusions, but the subject is one of very great importance. Concerning the utilization of existing private munitions plants after the close of the European war, the Secretary makes a suggestive statement indicating at least his own personal opinion as to the advisability of exclusive Government manufacture of war materials. He says:

> There are in the United States at the present time a great many industrial establishments which have turned aside from their ordinary business to the manufacture of war materials, and large plants have been established for this special object. After the passage of the occasion for which these enterprises were established the difficulty will arise as to whether their facilities are to be transformed and devoted to other industrial uses or any part of them preserved in readiness for similar supplies for the United States. Some of these plants are located on the seacoast and others at more remote places. It will therefore be incumbent upon the department to select for patronage and encouragement certain of them, and in determining which are to be so chosen a variety of military considerations arise. It would seem, however, that with such facilities in existence it will be unwise to allow them to be dismantled, and the necessary large additions made to existing Government facilities which would be required to equip the Government to supply its own needs under war conditions, and as any war condition requires a mobilization of the entire industrial resources of the nation, there would seem to be no reason why munitions of war should be separated out for Government monopoly, unless that course should turn out to be necessary to prevent the appearance of prospective war profits as a disturbing element in the policy of the nation.

THE GOVERNMENT AS "MODEL EMPLOYER"

Taking up the question of scientific shop management, Secretary Baker says that the question of the relation between the Government as employer and its employees in the arsenals is a part of the general labor of the country. The theory which the department attempts to follow is in general terms that the Government should be the model employer and to a large extent this theory is successfully applied. In the matter of hours of labor, sanitary conditions, holidays and sick leave, the Secretary says, there is no better industrial condition in the United States than that maintained by the War Department in these industrial plants. The question of wages and the basis thereof is, however, under more or less constant discussion. Roughly speaking, the department undertakes to establish wage rates by determination of the prevailing rate of wages in similar employments within the district in which the particular arsenal is located and it uses Department of Labor statistics in reaching its conclusions. The result is, the Secretary says, that the employees of the Government receive the prevailing rate of wage in their respective occupations, "but usually for a day of shorter hours than is observed in the private industries from which the information is drawn, and clearly for work done under conditions much more favorable to the public employee than to the private employee." Taking up the subject of scientific management, the Secretary says:

> A system of time studies and premiums known as the "Taylor system" was adopted in part in some of the arsenals, but it met with the opposition of organized labor and Congress prohibited the use of the system. We have been obliged, therefore, to fall back upon the less scientific and less just methods previously employed.
>
> It seems without doubt that an efficiency system properly constructed and justly applied is fairer alike to the Government and to the employee than any more haphazard method. The objection of organized labor is not unnatural; it proceeds from the belief that all efficiency systems tend to become "speeding-up" systems and that their logical operation increases the output without a corresponding increase of wage. This, however, must, of course, be due to the method of applying the system rather than to the system itself, and after examining the results obtained in Government arsenals where the system was in whole or in part followed, I am persuaded that no such evil effects as these were permitted to occur. How far the action of Congress was dictated by a belief that efficiency systems inevitably tended to the enervation of the employee I have not the means of knowing, nor do I know what evidences of such results in private establishments were considered; but under law as it now is the department is prohibited from using time studies and premiums, and is therefore deprived of the means of acquiring the sort of knowledge without which just wage regulation is impossible, or of offering inducements to zeal and good workmanship, which if offered in moderation constitute a just recognition of individual skill and energy.

Secretary Baker strongly recommends the enactment of an equitable law providing for the retirement of superannuated and disabled employees along the lines adopted in recent years by various industrial and transportation companies. Such a law, in his opinion, would enable the Government to replace employees who have served the Government long and faithfully, but who are no longer competent to perform the work assigned to them. Such a system would cost but a moderate sum annually and would greatly increase the efficiency of the service. W. L. C.

New Lock Washer Company

The Mansfield Lock Washer Company, recently organized, has purchased the plant of the Triumph Valve Company, Mansfield, Ohio, taking immediate possession. The main building is 40 x 140 ft., built of brick, two stories. A wing will be constructed as quickly as possible. As much of the machinery used by the Triumph Valve Company will be available for the new company, it is expected that the plant will be in active operation inside of two months. Patents are owned on machines used in the production of lock washers which will enable greatly increased output over usual methods. The bulk of the product of the company will be sold to the automobile trade. William H. Davey, president and general manager of the Mansfield Sheet & Tin Plate Company, is president of the new company. Charles F. Ackerman, president Mansfield Savings Bank, is vice-president. A. E. Witter, formerly of Massillon, is secretary and treasurer. F. E.

Kessel, who has been associated with Mr. Witter and who holds patents on various machines to be used, is general superintendent.

New Malleable Iron Foundry

The Richmond Malleable Castings Company, Richmond, Ind., is entirely a new industry, but the organization, such as the manager, superintendent, melters, and foremen, represents an old organization of long experience. The company even has quite a body of experienced molders available. The two main buildings are 100 x 350 ft. and 85 x 250 ft., with two wings, one 60 x 125 ft. and the other 40 x 60 ft. All buildings are of concrete, brick, and steel, with automatic sprinkler protection throughout. The equipment comprises three air furnaces, each of 20 tons capacity, and six annealing ovens that are more than sufficient to take care of the daily capacity. For the present the company will be in position to produce 25 tons of castings daily.

Quality and service will be the aim of this new enterprise. Its annealing process covers eight days, which indicates the intention to produce only first-quality castings. No expense has been spared in installing modern devices to aid in economical production. Every casting will be cleaned by sand blast. The plant will handle any class of castings from light to heavy, having various types of squeezers and molding machines, while bench and floor work will be used for the more intricate.

Die Casting Companies Merged

The entire business of the Van Wagner Die Casting Corporation and that of the Precision Die Casting Company, Syracuse, have been purchased from Charles Van Wagner and the two companies merged into the latter corporation, which has been incorporated with a capital stock of $315,000. The plant of the new company, manufacturing die castings, is at Fayetteville, N. Y., and employs about 100 workmen. Alterations and extensions are now being made to increase the capacity and efficiency of the plant.

T. G. Meachem, vice-president and general manager of the New Process Gear Corporation, Syracuse, has been elected president; J. W. Knapp, former treasurer of the Van Wagner Die Casting Corporation, vice-president; H. S. Tenney, treasurer, and E. J. Quintal, secretary. The officers and A. P. Bellinger of the Solvay Process Company, Syracuse, and W. A. Ball of the Semet-Solvay Company, Syracuse, and G. W. Bowen of the Bowen Mfg. Company, Auburn, N. Y., make up the board of directors.

Chicago Machinery Houses Merge

The Stocker-Rumely-Wachs Company, Chicago, has been formed as successor to the H. A. Stocker Machinery Company and the Rumely-Wachs Machinery Company, effective Jan. 1, 1917. It will be located at 117-119-121 North Jefferson Street, Chicago, the present location of the Rumely-Wachs Machinery Company. The officers of the new organization are H. A. Stocker, president; William N. Rumely, vice-president; H. J. Reeve, treasurer; O. A. Wachs, assistant treasurer; Edward H. Wachs, Jr., secretary. The capital stock of the new organization will be $225,000. The selling force of both concerns will be retained, and, in addition to the lines already handled, a number of other lines will be taken up.

The first open-hearth steel ingot to be poured in the new plant of the Llewellyn Iron Works, at Torrance, near Los Angeles, Cal., has been on exhibition at the Los Angeles Chamber of Commerce. The ingot weighs 1230 lb. It is expected that the steel plant will be under regular operation early in January.

Shortage of coke has necessitated the closing down of furnace No. 2 of the Eastern Steel Company, Pottstown, Pa. The stack is to be rebuilt by April 1. The last blast was started March 19, 1914, and since that time 457,000 tons of pig iron has been turned out.

Tests of Cast Steel Bars, Annealed, Forged and Heat Treated

Some interesting physical tests have been made on cast steel bars subjected to varying heat treatment or heat treatment similar to that given forgings. The steel was basic open-hearth made from acid scrap by the Federal Steel Foundry Company, Chester, Pa. High-grade scrap, low in sulphur and phosphorus, is further refined on a basic bottom—the only foundry, it is believed, where such practice is followed.

All test bars used were annealed by the regular practice of slow cooling from just above the recalescence point. Some were then forged and tested, or heat-treated after forging and then tested. The results, with the heat treatment given each bar, were as follows for bars having a diameter of 0.505 in. or 0.200 sq. in. of area.

Bar	Elastic Limit Lb. Per Sq. In.	Tensile Strength, Lb. Per Sq. In.	Elongation in 2 In., Per Cent	Reduced Area Per Cent	Fracture
1.....	44,000	85,500	20.0	29.2	⅝ silky
2.....	49,000	97,500	20.5	31.5	⅛ cup
3.....	46,500	86,000	23.5	40.3	cup
4.....	48,000	94,000	22.5	40.7	½ cup
5.....	45,000	87,500	22.0	34.4	½ cup
6.....	48,000	94,500	16.0	21.3	silky-flaw

Bar	Heat Treatment
1	Annealed as in ordinary practice.
2	Annealed as in ordinary practice and then forged from 1¼ in. down to ⅞ in.
3	Annealed as in ordinary practice and then forged from 1¼ in. down to ⅞ in. and reheated to 1400 deg. Fahr. and quenched in oil; then annealed at 900 deg. Fahr.
4	Annealed as in ordinary practice; reheated to 1400 deg. Fahr. and air chilled.
5	Annealed as in ordinary practice; reheated to 1400 deg. Fahr., quenched in oil and reheated to 900 deg. Fahr.
6	Annealed as in ordinary practice; reheated to 1400 deg. Fahr. and quenched in oil.

The extent to which the forging alone has increased the tensile strength of the simply annealed metal is surprising—from 85,500 to 97,500 lb. per square inch, as in bar No. 2—with no loss of ductility and little change in elastic ratio. Heat treatment after forging bar No. 3 maintains the strength where it was, but increases the ductility and the elastic ratio. Even air chilling or oil quenching after reheating the annealed bar to 1400 deg. Fahr., as in bars Nos. 4 and 6, did not bring the tensile strength up to the forged bar No. 2. Tempering the oil-quenched bar by reheating to 900 deg. Fahr. did not produce as good static results as the same treatment on the forged bar. Forging the annealed cast steel before special heat treatment evidently in this case benefits the metal, in that superior results are obtained.

The chemical composition of the steel was as follows:

	Per Cent		Per Cent
Carbon	0.28	Sulphur	0.038
Manganese	0.81	Phosphorus	0.026
Silicon	0.341 per cent		

The high manganese and the low phosphorus and sulphur are the striking features of this metal. By such a composition, relatively low carbon and high manganese, a high tensile metal of good ductility and of tough quality is obtained which will meet the Government specifications for class A steel, requiring a minimum of 80,000 lb. per square inch of tensile strength. Usually most foundries produce a steel of 0.40 per cent carbon and 0.60 to 0.65 per cent manganese for this purpose—a metal very difficult to make and cast free from blow holes, etc.

Important Foundry Consolidation

It is announced that the plants of the Medina Foundry Company, Medina, Ohio, and the T. E. Henry Furnace Company, Cleveland, and foundries controlled by the same interests in Canton and Chagrin Falls, Ohio, will be consolidated under one company with a capital stock of $600,000. W. H. Hobart resigned as secretary and treasurer of the Medina Foundry Company Dec. 1.

The Colt's Patent Fire Arms Company, Hartford, Conn., has received from the Government an order for 75,000 pistols, according to press report. The total value of the order is reported to be $1,125,000.

Machinery Markets and News of the Works

WESTERN RAILROADS BUY

Large Shop Equipment Lists in Chicago

Lines Not so Active in the East, but Doing a Little—Electric Motors and Control Devices Are Advanced

News from Western cities, Chicago in particular, dwells on the greater extent to which several of the railroads have entered the market for machine tools and shop equipment. For its West Burlington shops the Chicago, Burlington & Quincy has issued a list of 75 tools on which it expects to close Dec. 24, and also has in preparation a list for a smaller shop.

The Chicago, Minneapolis, St. Paul & Omaha division of the Chicago & Northwestern has issued from St. Paul a list of 50 machines wanted for its car-building shops. The Rock Island and Santa Fe also are in the market.

The Pennsylvania Lines East have been doing some quiet buying in Cincinnati, taking lathes and drilling machines, among other tools.

In the East the Pennsylvania and the Baltimore & Ohio have purchased or opened bids on a few machines.

The general industrial demand is good everywhere. In Detroit it is expected that machine-tool prices will advance, and sellers are urging their customers to act quickly. From elsewhere it is reported that electric motors and control devices have each been advanced 10 per cent. Lathe prices have been advanced in Chicago. Deliveries are worse in Detroit, and this probably accounts for a slight falling off in the volume of business in that city.

In Cleveland buyers are anticipating their needs, some having contracted for deliveries 14 months ahead. Following a period of comparative quiet, the Cleveland trade is again working under a fairly heavy demand. Milwaukee reports no let-up in the active scattered business, so strong of late.

The Pacific coast continues prosperous. The demand in San Francisco is active enough to keep merchants' stocks depleted. In the Pacific Northwest new shipbuilding plants are nearing completion and others are projected.

New York

NEW YORK, Dec. 13, 1916.

Inquiry from scattered sources for one or two machines continues to come out at a lively rate, although on some of the more expensive tools buyers are rather slow in closing, and with the makers of these machines business is not so good as it was last month. Deliveries have for the time being ceased to improve. Some makes of small standard turret lathes are likely to be very scarce again.

The Baltimore & Ohio Railroad has purchased two 3½-in. bar machines (turret) for its shops at Mount Clare, Baltimore, Md., and the Pennsylvania Railroad opened bids on Dec. 6 for one 2-in. turret lathe and one 3-in. turret lathe for its Trenton shops, evidence that the railroads are more actively interested in machine tools. The Oxweld-Acetylene Company has purchased eight hand screw machines.

The F. H. Lovell Company, Arlington, N. J., has purchased several tools, including a few engine lathes and hand screw machines.

The machine-tool trade is being reminded that freight conditions are as likely to be as bad this winter as they were last. The Pennsylvania Railroad has embargoed certain export shipments and a shipper was informed last week that the New York Central had placed an embargo on export shipments that originate at points east of Chicago.

Electric motors have been advanced 10 per cent in price, and a maker of electrical control devices announces a similar advance.

The Steel Equipment Corporation, Avenel, N. J., has taken over the Fireproof Furniture & Construction Company of Miamisburg, Ohio, maker of steel office equipment. This follows the taking over of the U. S. Steel Furniture Company of Syracuse, N. Y., by the Fireproof Furniture Construction Company. The Steel Equipment Corporation will have a capitalization of $700,000 and outstanding bonds to the amount of $74,000. It is now erecting at Avenel at a cost of $500,000 a factory exclusively for the manufacture of steel furniture. The plant at Miamisburg, Ohio, has already been moved to Avenel, and the work of the Syracuse factory will also be transferred there soon. The officers of the new corporation have been for the most part identified in similar capacities with the Fireproof Furniture & Construction Company. They are M. Taylor Pyne, Jr., president; W. I. Seaman, vice-president; H. D. Tucker, treasurer and general manager, and A. E. Pattison, secretary. The directors are Messrs. Pyne, Seaman, Pattison, James S. Rogers, Thomas D. Wood, Levi Chapman, and John J. Flynn.

Feist & Feist, Inc., 738 Broad Street, Newark, N. J., have sold to the Talbot Engine Company, 120 Liberty Street, New York, two buildings of the old Lozier motor plant at Plattsburgh, N. Y., together with a plot of land covering 3 acres. One building is 60 x 300 ft. and the other 50 x 200 ft. A siding from the Delaware & Hudson Railroad enters the property. The company will use the buildings for the manufacture of marine boilers and engines.

The Mutual Electric Company, 122 Water Street, New York, is in the market for power presses from 5000 to 20,000 lb. in weight; also for planing machines, shaping machines, and lathes.

The Universal Ice Mfg. Company, 391 East 149th Street, New York, is receiving bids for ice-making equipment and for the construction of its proposed plant on a site 80 x 133 ft.

The Buffalo Foundry & Machine Company, Buffalo, is having plans prepared for a three-story pattern shop and storage building, 53 x 243 ft., estimated to cost $50,000.

The new plant of the United States Alloys Company on the River Road, Buffalo, contract for construction of which has been let to the Lackawanna Bridge Company, Buffalo, will consist of four buildings, 55 x 135 ft., 40 x 90 ft., 32 x 90 ft., and 32 x 62 ft., respectively.

The Pierce-Arrow Motor Car & Truck Corporation, Buffalo, has been incorporated with a capital stock of $11,250,000 and has taken over and will operate the plant of the Pierce-Arrow Motor Car Company, at Elmwood Avenue and the New York Central Railroad Belt Line in that city, for the manufacture of automobiles and motor trucks. The directors of the new corporation are Arthur P. Bush, Garden City, L. I., N. Y.; Basil B. Elmer, Leonard D. Adkins, Rufus J. Trimble, Edward S. Hemphill, and Vivian C. Ross of New York City; Richard Lukeman and Joseph H. Snyder, Brooklyn; Charles Clifton, Henry May, and Joseph G. Dudley, Buffalo. Charles Clifton is president and Henry May vice-president.

The factory to be erected at New Rochelle, N. Y., by the H. W. Johns-Manville Company, New York, will be 100 x 200 ft., six stories. F. F. Manville is president.

The Bayer Chemical Company, Rensselaer, N. Y., has let contract for erection of a boiler house, 50 x 75 ft., one story.

Yonkers, N. Y., has authorized the installation of a pump of 3,000,000 gal. per day capacity in the tube well station, eliminating the high-service station. Edward L. Peene is superintendent.

The Rome Brass & Copper Company, Rome, N. Y., will build a casting shop, 100 x 200 ft., one story, from private plans.

The cement plant to be erected at Phelps, N. Y., by the Bennett Corporation, Syracuse, N. Y., will comprise a two-story building, 120 x 120 ft., a one-story building, 100 x 150 ft., and a power house. Plans are being drawn. The total cost is estimated at $1,250,000. The Kennedy Engineering

Company, 120 Broadway, New York, is the architect and engineer.

Oswego, N. Y., has plans practically completed for its proposed hydroelectric plant to be constructed at Oswego River dam No. 6, the estimated cost of which is $600,000. The initial building will be 50 x 120 ft., one story. John A. Bensel, 111 Broadway, New York, is consulting engineer.

The Newark Rivet Works, 268 Lafayette Street, Newark, N. J., manufacturer of umbrella hardware, will build a one and two-story brick addition, 68 x 78 ft., to cost $11,000.

The Valley Forge Cutlery Company, Newark, N. J., manufacturer of pocket knives, will build an addition to its plant on South Sixth Street, to cost about $3,500.

The Standard Stove & Light Company, Newark, N. J., has been incorporated with a capital stock of $200,000 to manufacture hydro-carbon burners and kindred specialties. Thomas B. Ferguson, James L. Goodwin and John S. Sheldon are the incorporators.

Cyrus Currier & Sons, Newark, N. J., manufacturers of machinery, will build a new one-story foundry at 190 Commerce Street to cost about $2,000.

Fire Dec. 8 destroyed part of the wire nail manufacturing plant of Igoe Brothers, Avenue A and Poinier Street, Newark, N. J., with loss estimated at $15,000.

The Jewel Lamp Company, Newark, N. J., has been incorporated with a capital stock of $125,000 to manufacture lamps. Joseph J. Steinharter, Joseph and Samuel E. Hollander are the incorporators.

The Witteman Aircraft Company, Stapleton, Staten Island, N. Y., manufacturer of aeroplanes, etc., has acquired 8 acres of land on Meadow Street, Newark, N. J., as a site for a new plant. The present two-story building on the property, about 65 x 200 ft., will be utilized to commence operations. Charles R. Witteman is president and L. C. Lewis is vice-president.

The Egyptian Lacquer Mfg. Company, Rahway, N. J., has acquired a tract of land, about 670 x 850 ft., on Passaic Avenue, Kearny meadows, Newark, N. J., as a site for a new plant to replace its factory recently destroyed by fire. The proposed plant will comprise 6 buildings, 3 of which will be erected at once at a cost of $100,000. The Turner Construction Company, 11 Broadway, New York, has the contract for erection.

The New Jersey Tube Company, Harrison, N. J., manufacturer of sheet brass and brass tubing, will build a one-story addition to its plant, 120 x 280 ft., on Kingsland Avenue.

The Perth Amboy Cornice & Skylight Works, Perth Amboy, N. J., has been incorporated with a capital stock of $100,000 by Samuel and Joseph Diamond, Perth Amboy, and Victor Diamond, Philadelphia.

The Babcock & Wilcox Company, Bayonne, N. J., manufacturer of watertube boilers, will build an addition to its plant at Lexington Avenue and Third Street, to cost about $100,000. A portion of the new structure will be used as a drum shop.

The Bayonne Casting Company, Bayonne, N. J., manufacturer of monel metal, bronze and steel castings, etc., has awarded a contract for improvements in its plant to cost about $4,500.

The Hudson Consumers Ice Company, Hoboken, N. J., has broken ground for an ice-manufacturing plant at Monroe and Thirteenth streets, to cost about $300,000. Anthony J. Volk is president.

The Wilson Wire Works, 100 Devon Terrace, Kearny, N. J., has been incorporated with a capital of $10,000 to take over and operate the wire and metal manufacturing plant heretofore carried on in this name. John J. Wilson 414 Chestnut Street, Arlington, and John W. Gleason, 417 John Street, East Newark, are the principal incorporators.

The Air Reduction Company of New Jersey, Jersey City, N. J., has been incorporated with a capital stock of $150,000 to manufacture oxygen and kindred specialties. C. H. Jarvis, Philip L. Nieser and J. R. Turner are the incorporators.

Thomas A. Edison, Inc., Belmont Avenue, Bloomfield, N. J., will build a one-story addition to its storage battery manufacturing plant to cost about $8,000.

The Belleville Copper Rolling Mills, Belleville, N. J., manufacturer of copper sheets, bars, etc., will build a one-story addition to its plant.

G. D. Miller, H. T. Corce and J. L. Fox, Dumont, N. J., have incorporated in New York the High Speed Tool Corporation with a capital of $1,000,000 to manufacture high-speed tools, etc.

New England

BOSTON, MASS., Dec. 11, 1916.

A managing committee, consisting of Samuel F. Pryor, vice-president; James H. Perkins, vice-president of the National City Bank of New York; G. M. P. Murphy, vice-president of the Guaranty Trust Company of New York; Henry S. Kimball, former president of the American Zinc, Lead & Smelting Company, and W. E. S. Griswold, is to direct the activities of the Remington Arms-Union Metallic Cartridge Company. Mr. Pryor has been elected chairman of the committee and Mr. Kimball has been made president, succeeding Marcellus Hartley Dodge. C. S. Hawley, formerly president of the Laconia Car Company, has become associated with the company as treasurer.

The Mayo Radiator Company, New Haven, Conn., will be conducted for one month by James E. Wheeler, appointed temporary receiver by the Superior Court. An effort to depose Virginius J. Mayo as president by action of the board of directors brought about the temporary receivership. James Duncan Livingston has been elected president by the directors and E. B. Shoemaker has been chosen vice-president and general manager. A hearing set for Jan. 5 will determine if the receivership shall be made permanent.

The Hendee Mfg. Company, motorcycle manufacturer, Springfield, Mass., will have a special stockholders' meeting, Dec. 15, to vote upon the sale of the company's East Springfield plant, its realty now occupied by the Harley Company, and the stock of the Harley Company, which it owns. The plan is to consolidate all the manufacturing activities of the company at the Winchester Square plant, including the drop forging, which has been done by the Harley Company. The East Springfield factory is a building of modern construction and contains 3½ acres of floor space.

The Beach Mfg. Company, New Haven, Conn., has been organized, with William J. Beach, president; Howard E. Adt, vice-president, and Thomas M. Steele, secretary and treasurer. Its authorized capital stock is $50,000, not $500,000, as was erroneously reported in THE IRON AGE of Nov. 23.

The H. G. Thompson & Sons Company, New Haven, Conn., has bought a site for a new plant at Chapel and Mill River streets and Saltonstall Avenue.

The Commonwealth Screw Company, Worcester, Mass., has been incorporated with capital stock of $50,000. The directors are Iver Johnson, president; Frederick W. Lodding, 7 West Lake Street, Worcester, treasurer, and George M. Faulkner.

Landers, Frary & Clark, New Britain, Conn., have awarded a contract for a factory, 38 x 238 ft., two stories.

E. E. Bussey, Inc., operating a general foundry and machine shop, Boston, Mass., has been incorporated with a capital stock of $1,000. C. A. Bussey is president; Everett E. Bussey, Malden, treasurer, and J. N. Johnson.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has awarded a contract for an addition, 34 x 74 ft.

The Forkas Company, Providence, R. I., has been incorporated with capital stock of $10,000 to manufacture machinery by Karl Forkas, Henry C. Hart, and Patrick P. Curran.

The Weco Mfg. Company, Boston, Mass., has been incorporated with capital stock of $50,000 to manufacture electrical, gas, and oil heating appliances. The directors are Hans R. Boker, president; Harry B. Eaton, Waban, treasurer, and J. Leo Hickey.

The United States Steamship Company, New York, has selected Hamilton & Chambers, New York, it is reported, as engineers to design its new shipbuilding plant at Groton, Conn.

The Warren Brothers Company, Cambridge, Mass., is to build a machine shop, 41 x 170 ft., one story.

The Superior Mfg. Company, Bridgeport, Conn., has been organized with Edward L. Hyde, president; Daniel J. Sullivan, treasurer, and Bessie M. Hyde, secretary.

The Metz Company, Waltham, Mass., has awarded a contract for an addition, 40 x 80 ft., one story.

The Hyde Windlass Company, Bath, Me., has awarded contract for a machine shop, 80 x 100 ft., one and two stories, and an office building, 55 x 60 ft., two stories.

The recent announcement that the General Mfg. Company, Waterbury, Conn., has awarded contract for a four-story factory is incorrect. The building will be 40 x 98 ft. and 25 x 60 ft., three stories, and is being erected by the American Fastener Company, which at present occupies buildings belonging to the General Mfg. Company.

The Becker Milling Machine Company, Boston, Mass., incorporated last week for $2,250,000, has elected Robert F. Herrick president and Joseph W. Lund, Hyde Park, treasurer.

The Boston Cost Recorder Company, Boston, Mass., has been incorporated with capital stock of $50,000. The directors are Charles E. Russell, president; Robert E. Walmsley, Hyde Park, treasurer, and Albert Stonestreet.

The Taunton Copper Company, West Water Street, Taunton, Mass., is building an addition, 24 x 80 ft., one story.

The Chase Metal Works, Thomaston Avenue, Waterbury, Conn., has been granted a permit to erect additions, 60 x 100 ft. and 20 x 140 ft.

The Stanley Works, New Britain, Conn., having secured a controlling interest in the Farmington River Power Company, has begun the building of a transmission line, 23 miles long, from the power plant at Poquonnock, Conn., and will use the entire output of the power station.

The Bancroft Razor Company, Worcester, Mass., has been incorporated with capital stock of $10,000. The directors are Charles A. Hamilton, president; C. Gustaf A. Hammarberg, Worcester, treasurer, and George P. Hughes.

Philadelphia

PHILADELPHIA, PA., Dec. 11, 1916.

The American Metal Works, Armat and Heiskel streets, Philadelphia, has purchased a site of about 4½ acres on the Reading Railroad, near Wayne Junction. It has a frontage of 553 ft. on Stenton Avenue. The company will erect a factory on part of the plot at an estimated cost of $100,000, and will sell the remainder to other manufacturers.

The International Fabricating Corporation, Wilkes-Barre, Pa., is in the market for new or second-hand plain, internal or universal grinding machines for tool work only and equivalent to Brown & Sharpe type Nos. 11, 1, and 2. Morse, Brown & Sharpe, Pratt & Whitney, or Heald machines preferred.

The Camden Iron Works, Camden, N. J., has had plans drawn for a one-story erecting shop, 50 x 78 ft., to cost about $15,000.

Horn & Devling, contractors for hardware, plumbing, heating, and building, Galeton, Pa., are erecting a five-story reinforced concrete plant, 55 x 75 ft., to replace a former one destroyed by fire.

Herman L. Winterer, 908 Beach street, Philadelphia, will purchase a 15-ton hand or electric crane of 30-ft. span.

The Pennsylvania Tubing Company, Philadelphia, has awarded a contract for the erection of a one-story brick addition, 44 x 92 ft., at Seventy-third Street and Powers Lane.

The Weidermann Machine Company, Philadelphia, will build a new one-story brick machine shop at Sedgley Avenue and Gratz Street.

F. R. Hansell, Philadelphia, and associates, have incorporated in Delaware the Cosmic Metal Company, with a capital of $500,000 to manufacture bearing metals. George H. B. Martin and S. C. Seymour, Camden, N. J., are active in the company.

J. Durbin Nevius, Milo D. Baldy and Henry F. Sanville, Philadelphia, have incorporated in Delaware the Spring City Steel Company, with a capital stock of $350,000 to manufacture steel and malleable castings.

The Northeastern Mfg. Company, Bordentown, N. J., will establish a plant in the Martin Garage Building for the manufacture of incubators and brooders. John F. McKay is president.

Ernest H. Fairbanks, Merchantville, N. J., and associates, have incorporated in Delaware the Haag Cabinet Company, with a capital of $100,000 to manufacture talking machines. Frank P. Slocomb, Philadelphia, and Alfred H. Haag, Newport News, Va., are also incorporators.

The American Hollow Tile Company, Hightstown, N. J., recently organized, has acquired the brick yards of B. H. Reed & Brothers, and will establish a plant for the manufacture of hollow tile, brick and similar specialties. An addition will be erected to the present factory, to include the installation of new conveying equipment. Robert W. and William J. Lyle, New Brunswick, are promoting the company.

The Federal Automobile & Supply Company, Camden, N. J., has been incorporated with a capital of $100,000 to manufacture motor vehicles and equipment. Charles M. Reeves, Camden; William A. Walton, Oxford; and Thomas R. Roberts, Philadelphia, are the incorporators.

The Philadelphia & Reading Railroad will build an addition to its foundry at Pottstown, Pa., to cost about $15,000. William H. Wiand, Pottstown, has the contract.

Fire Dec. 4 destroyed the wheelwright shop of William Rockhill, Tullytown, Pa., with loss of about $8,000.

The Homer City Coal Company, Homer City, Pa., will build a plant for the manufacture of mine cars for company use. Offices are maintained in the Stephen Girard Building, Philadelphia.

Baltimore

BALTIMORE, MD., Dec. 11, 1916.

The Monumental Heel Company, 2401 West Baltimore Street, Baltimore, manufacturer of rubber heels and soles, of which Joseph T. Mahon is general manager, is considering the construction of a plant.

The C. E. Hosbach Company, 808 East Fayette Street, Baltimore, manufacturer of automobile tops and wagons, will build a one-story machine shop, 34 x 69 ft., to cost about $1,500.

The Alexander Milburn Company, 1420 to 1426 West Baltimore Street, Baltimore, acetylene light contractor and welder, has increased its capital stock from $200,000 to $227,500.

The Wayne Safe & Lock Company, 224 West Pratt Street, Baltimore, has been incorporated with $25,000 capital stock to manufacture safes, filing cabinets, etc. The incorporators are Anthony and Mary E. Aub and John M. Bellamy.

The Baltimore Tube Company, Wicomico and Ostend streets, Baltimore, will build a one-story office building.

Plans are being made to rebuild the roundhouse, blacksmith shop, boiler house and tin shop of the Norfolk & Western Railway, Shenandoah, Va., recently damaged by fire.

The Piedmont Motor Company, Lynchburg, Va., is planning the construction of an automobile assembling plant.

About $40,000 will be spent to improve the municipal electric light plant at Franklin, Va.

Chicago

CHICAGO, ILL., Dec. 11, 1916.

The market is featured by the long delayed but now voluminous railroad inquiry for shop equipment. The list issued by the Chicago, Burlington & Quincy for closing Dec. 24 covers the full range of tools for its new West Burlington shops, a list of some seventy-five machines, together with auxiliary equipment and motor drives. The same road has another list in preparation for a smaller shop which will be sent out shortly. The Chicago, Minneapolis, St. Paul & Omaha division of the Chicago & Northwestern has sent out from St. Paul a list of about fifty tools of the types suitable to car building shops, on which it is asking prices. The Rock Island and Santa Fé railroads are also buying a number of machines. Added to this is a large list closing Dec. 15 for the new small arms plant of the Rock Island Arsenal, requirements embracing a general equipment of some fifty machines, including turret and standard lathes and milling, drilling and shaping machines. The general industrial demand continues abnormally heavy and sales of tools in lots of two and three machines up to $10,000 and $15,000 equipments are of regular and daily occurrence. An inquiry is in this market for 200 shell-turning lathes. Some of the lathe manufacturers have again advanced prices. Deliveries are generally unimproved, though turret lathes appear to be available more promptly.

H. C. Williamson, manufacturer of metal band sawing machines, 1840 West Lake Street, Chicago, will equip his new shop for general machine and tool work as well.

Plans for a two-story garage and machine shop, 60 x 150 ft., are being prepared by A. G. Burtar, 3958 West Madison Street, Chicago.

The Wahl Adding Machine Company, 232 East Ohio Street, Chicago, is building a three-story factory to cost $95,000.

Arnold Schwinn & Co., 1718 North Kildare Avenue, Chicago, manufacturers of bicycles, will build a one-story factory, 95 x 134 ft., to cost $15,000.

The Octigan Drop Forge Company, Twenty-fifth Street and Lowe Avenue, Chicago, advises that the plans for its new shops provide for a forge plant with capacity of thirty drop hammers, machine shops and auxiliary departments, the whole to cover approximately 4 acres.

The Chicago Flexible Shaft Company, Chicago, has been under the necessity of temporarily renting floor space outside of its present factory to take care of the exceptional growth of its business in gasoline engines and gas blast furnaces until the new factory space becomes available about March 15. The new building will be one story, of sawtooth roof and mill type construction, with a floor space of about 132,000 sq. ft.

The Hanna Engineering Works, Chicago, which some months ago sold its property to the Erie Railroad, has purchased the Gates Iron Works plant of the Allis-Chalmers Mfg. Company at Chicago and will occupy it about April 1.

The W. F. Hall Printing Company, Chicago, has acquired property adjoining its building at Superior and Kingsbury streets and will erect an addition to cost about $750,000.

The Venn Severing Machine Company, 1317 West North

Avenue, Chicago, will build a one-story brick addition to its shop to cost $2,000.

The Riverside Foundry & Machine Works, Chicago, will build a machine shop, 42 x 132 ft., to cost $12,000. Heimbeck & Bacon, 852 East Sixty-third Strtet, are the architects.

Chatten & Hammond, architects, 64 East Van Buren Street, Chicago, have completed plans for the four-story factory building, 150 x 150 ft., for the Excelsior Steel Furnace Company, to cost $100,000.

The Stromberg Motor Service Company, Chicago, will erect a six-story concrete factory building at 58 East Twenty-fifth Street, to cost $65,000.

E. R. Klem, 1453 Austin Avenue, Chicago, has had plans prepared for a two-story machine shop, 24 x 156 ft., to cost $15,000.

The Wilson Stove & Mfg. Company, Valley Park, Mo., will erect a one-story factory, 72 x 80 ft., at Metropolis, Ill. Gustave P. Wuest, St. Louis, is the architect.

The Vermillion Malleable Iron Company, Hoopeston, Ill., will build a one-story addition to its foundry, 49 x 56 ft., and an addition to its pattern shop, 40 x 56 ft.

The Champion Motor Company will establish a factory at Fulton, Ill., for the manufacture of light delivery trucks.

The Baker Mfg. Company, Springfield, Ill., which is adding 50 per cent to its floor space with an addition to its factory, has purchased most of the new machinery to be required, except one drill press. M. W. Baker of this company, together with J. G. Miller, secretary, is also equipping a gray-iron foundry at Springfield, to be known as the B. & M. foundry.

The Gardner Governor Company, Quincy, Ill., advises that it has purchased a 10-ton Pawling & Harnischfeger crane to be installed in its new factory building, which has a floor space of about $24,000 sq. ft.

Webster City, Iowa, will install a 500-kw. steam turbine, 250-hp. boiler and stokers.

The Western Mfg. Company, Oskaloosa, Iowa, maker of concrete mixers, valves, etc., has plans for the enlargement and improvement of its plant.

The Northern Pacific Railroad has plans for new shops to be built at Mandan, N. D., to cost $1,500,000.

The Fountain Faucet Company, Torrey Building, Duluth, Minn., advises that it contemplates an expenditure of $18,000 for its new foundry and that it is in the market for turret lathes and other brass-working tools to the amount of $10,000. The equipment will also include air chucks on the turret lathes and the necessary compressors and storage tank equipment for the pneumatic system.

The Winnipeg Machine Exchange, Sutherland and Gladstone streets, Winnipeg, Manitoba, is in the market for a boring mill with a 30 to 42 in. table.

Detroit

DETROIT, MICH., Dec. 11, 1916.

Machinery dealers are urging customers to immediately purchase machinery as a general rise in prices is anticipated. Business in this district is good, although a slight falling off is noticed, due to the lack of large orders. Deliveries have become worse instead of better, and the 3 to 6 months demanded has been lengthened on some makes of tools.

The Buhl Sons Company, jobber of hardware, iron and steel tools, and factory and railroad supplies, will shortly begin the erection of three large buildings at the foot of Adair and Walker streets to care for increased business. The buildings will cost several hundred thousand dollars. The main building will be 80 x 402 ft., of reinforced concrete construction, equipped with a monorail.

The Evans Truck Mfg. Company, Detroit, has been incorporated for $10,000 by Robert H. Evans, 962 Bush Street, William M. Darling and Alvin Patterson.

The Universal Tool Company, Detroit, has been incorporated for $20,000 by Robert E. Roseberry, Keatley Green and Thomas A. E. Weadock, 811 Hammond Building, Detroit.

The J. E. Bolles Iron & Wire Works, Detroit, has awarded the contract for a new factory building, 170 x 260 ft., which will double its capacity. One of the largest brakes ever made for forming and bending sheet steel is now being manufactured by the Scully Steel & Iron Company for this plant.

The Republic Motor Truck Company has purchased the plant of the Little Giant Hay Press Company at Alma, Mich., and will use it for an axle plant.

James Bates, Wayne, Mich., has purchased property at Ypsilanti where he will erect a plant for the manufacture of die casting machines.

The Buss Machine Works, Holland, Mich., has increased its capital stock from $25,000 to $100,000.

Cleveland

CLEVELAND, OHIO, Dec. 11, 1916.

The demand for machine tools, after having quieted down for a short time, is again fairly heavy. Considerable new inquiry is pending, particularly for large standard machine tools. Buyers are anticipating their requirements and sales have been made for delivery 14 months ahead. In most cases, however, machinery would be taken for immediate delivery, if it were available. The business is well distributed. Dealers report several sales in lots of around a half dozen machines. The only large list out is for about 30 machine tools for the equipment for a new manufacturing plant. The demand for cranes continues heavy.

The Steel Car Company, Cleveland, recently incorporated with a capital stock of $500,000, has acquired a site of 30 acres along the Nickel Plate Railroad, east of Cleveland, and has commenced the erection of a plant, the first building to be 60 x 200 ft. P. J. Joyce, president of the Illinois Car & Mfg. Company, Chicago, is president; J. F. Farrell, vice-president and N. J. Clark, secretary of the Upson Nut Company, Cleveland, treasurer. The company will repair wood and steel cars.

The United Foundry & Machine Company, Ravenna, Ohio, is erecting the first unit of its new plant, a building 80 x 190 ft., to be used for making castings weighing up to 5000 lb. When completed a second unit to manufacture chilled and sand rolls and heavy castings will be built. This will have a roll turning shop and, it is stated, a machine shop will be built later for the manufacture of rolling-mill machinery. W. H. Blecker, Canton, Ohio, heads the enterprise.

The Premier Mfg. Company, Ravenna, has been organized to manufacture lock washers and will occupy the plant formerly used by the Cleveland Clutch Company. W. E., R. D. and C. H. Judkins are active in the company.

The Kauffman Mfg. Company, Bellefontaine, Ohio, has been organized to make automobile accessories and will occupy one of the buildings of the Humphreys Pipe & Foundry Company. J. G. Morris is president; J. S. Kauffman, vice-president and general manager, and C. M. Johnson, secretary.

The Ladel Mfg. Company, New Philadelphia, Ohio, recently incorporated with a capital stock of $75,000 to build a foundry and machine shop, has elected Fred F. Hall, president; Ivor Harris, vice-president and E. C. Browne, secretary, treasurer and manager.

The American Bow Socket Company, Ashtabula, Ohio, is enlarging its forge department by the erection of a building, 50 x 60 ft.

The Gilliam Mfg. Company, Canton, Ohio, which recently purchased the John Danner Mfg. Company's plant in Canton, has increased its capital stock from $350,000 to $800,000 and will build a one-story shop extension, 175 x 310 ft., for the manufacture of automobile parts.

The Canton Electric Company, Canton, will build a two-story repair shop and garage.

The McIntyre Motor Company, Toledo, Ohio, has been formed and will have a capital stock of $100,000 to manufacture a new type of motor. W. H. McIntyre and others are active in the company.

The Portage Iron & Wire Company, Akron, Ohio, has been incorporated with a capital stock of $50,000. Emil Vogebeer, H. A. Herman, William Hoffman, and others, are interested.

Indianapolis

INDIANAPOLIS, IND., Dec. 11, 1916.

The Ott Grinder Company, Indianapolis, has been incorporated with $50,000 capital stock to make machinery parts. The directors are Albert J. and Conrad L. Ott and Samuel Dowden. The company will move its plant from Chicago to Indianapolis. It manufactures grinders for finishing shafts, cylinders, etc.

The Burkhardt Motor Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture engines. The directors are Alexander and L. Burkhardt and Noble H. Wible.

The Stenotype Company, Indianapolis, has sold its plant at Owensboro, Ky., to the Murphy Chair Company, Detroit, which will build an addition and employ 1500 men.

The B & M Truck Company, Connersville, Ind., has been incorporated with $10,000 capital stock to manufacture motor vehicles. The directors are Alfred H. McFlarian, Burton M. Barrows and Arthur Dixon.

The Battery Service Company, Lafayette, Ind., has been incorporated with $5,000 capital stock to manufacture automobile batteries. Lafayette Jamison, Herbert H. Johnson and Franklin E. Hall are the directors.

The Meloy-Hert Mfg. Company, Shelbyville, Ind., has been

incorporated with $10,000 capital stock to manufacture furniture and wooden novelties. The directors are John F. and Carl K. Meloy and Anthony F. Hert.

The U. S. Slicing Machine Company, Laporte, Ind., has been incorporated with $1,000,000 capital stock to manufacture meat-slicing machines. The directors are J. C. Woodington, E. E. Gore and B. F. Irving.

The Enterprise Seed Cleaning Machine Company, Newcastle, Ind., has been incorporated with $10,000 capital stock by Orland C. Hatfield, Thomas J. Hatfield and Fred P. Davis.

The Wasmuth-Endicott Company, Andrews, Ind., manufacturer of kitchen cabinets and novelties, has increased its capital stock from $60,000 to $110,000.

The Chesapeake & Ohio Railway Company will immediately rebuild its car repair shops at Peru, Ind., recently destroyed by fire.

The National Spring Company, Newcastle, Ind., has increased its capital stock from $25,000 to $50,000.

The Standard Wheel Works, Terre Haute, Ind., has plans for a one-story foundry, with annealing ovens, 60 x 140 ft., and 60 x 180 ft.

The Farmers Utility Company, Evansville, Ind., has been organized by William J. Schuler, H. C. Weber and Hayward Flickner. It has a capital stock of $50,000 and will manufacture farm machinery.

Cincinnati

CINCINNATI, OHIO, Dec. 11, 1916.

Eastern railroads have lately been buying machine tools in this vicinity. Contrary to the general rule, no complete lists were sent broadcast, but negotiations were quietly conducted with manufacturers for the particular kind of machines on which they specialized. The Pennsylvania Lines East bought a considerable number of lathes and drilling machines, and also some milling machines. It is reported that the Western railroads have some inquiries out. Concerning export business, France is now the best customer for machine tools, although both Canada and Russia are still calling for lathes. Shipments to the latter country now consume so much time en route that business is slow in closing. Automobile and auto truck manufacturers are buying steadily, but not at the same rate as at this time last year. Jobbing foundries, which cater to the machine-tool trade, were never as busy as at the present time. Makers of electrical equipment report business excellent, with the majority of orders coming from domestic customers.

The Corcoran Mfg. Company, Cincinnati, recently incorporated, has purchased a site at Winton Place on which it intends to erect a building to manufacture automobile bodies. Preliminary plans are for a factory, 75 x 470 ft., four stories. The company also expects to increase its present plant for the manufacture of automobile specialties.

The Main Auto Machine Company, Cincinnati, will construct a two-story storage addition to its plant on Reading Road, and will add to its repair shop equipment.

The new plant of the Pfau Mfg. Company, Norwood, Cincinnati, manufacturer of plumbing supplies, will be 60 x 344 ft., four stories, of mill construction. Equipment details have not been given out.

The Charles Boldt Glass Company, Cincinnati, has let contract to the Ferro-Concrete Construction Company, Cincinnati, for a paper mill and box factory to be erected in East End.

The Central Foundry Company, Hamilton, Ohio, suffered a fire loss Dec. 6, estimated at $10,000. Rebuilding plans are under way.

The Maxfer Auto Truck Sales Company, Dayton, Ohio, has been incorporated with $10,000 capital stock by George H. Connelley and others. A repair and paint shop will be operated in connection with the storage rooms.

The John-Starr Company, Springfield, Ohio, will soon be incorporated by H. H. Starr and others to manufacture a hardware specialty. It is reported that its work will be done under contract for the present, and no equipment will be needed.

The Ramey Company, Chillicothe, Ohio, maker of electric vacuum cleaners, is preparing to remove its plant to Columbus, Ohio, and will double its capacity.

The Phelps Mfg. Company, Columbus, maker of automobile wire wheels, has increased its capital stock from $100,000 to $400,000 and will carry out its recently announced plans for enlarging its plant.

The Columbus Hoop Company, Columbus, recently suffered a fire loss estimated at $7,500. It will refit the burned portion.

The Jones Heel Company, Dayton, is reported to be considering the erection of a plant at Columbus. No confirmation of this has been obtained.

The Buckeye Iron & Brass Works Company, Dayton, Ohio, manufacturer of oil mill machinery, is contemplating the erection of a plant in Edgemont, a suburb.

Milwaukee

MILWAUKEE, WIS., Dec. 11, 1916.

No let-up in the demand for machine tools has been noted in the Milwaukee district in the first 10 days of December, although in some quarters it was felt that this condition might be expected at this time. Inasmuch as bookings are for delivery a long time forward, the seasonable aspect of tool demand has disappeared almost entirely and buyiug is well maintained. Requirements continue to be for one or two machines, with here and there a half dozen, to be delivered not much earlier than July 1. The car shortage is causing some inconvenience in making deliveries eastward and has aroused complaints from buyers who feel that they have already been obliged to wait long enough for deliveries because of the sold-up condition of shops, without suffering further delay on account of car shortage. General industrial activity continues at a high level. With the exception of strike troubles in the foundry trade at Racine, Wis. industry is singularly free from labor difficulties, although the shortage of skilled men is still acute in all metal-working lines.

M. P. Winther, Kenosha, Wis., who recently announced plans for establishing a large motor truck works at that point, has organized two companies, as follows: The Winther Motor Truck Company, capital stock $300,000, and the Winther Securities Company, Kenosha, capital stock $50,000. The incorporators are identical and include M. P. Winther, William Martinson and W. M. Burke.

The Electric Tool & Appliance Company, Milwaukee, organized with a capital stock of $20,000 by Oscar Werwath and William Baum, Stroh Building, will lease temporary quarters for the manufacture of patent box cutters and scientific laboratory apparatus, pending the erection of its own plant some time in 1917. Mr. Werwath is president and Mr. Baum is secretary and treasurer.

Joseph Sairs, Beloit, Wis., is having plans prepared for a two-story factory and warehouse, 50 x 160 ft., for the manufacture of brake linings and other automobile specialties. It will be erected in the spring.

The Continental Motor Truck Company, Superior, Wis., has completed work on its new factory and machine shop and is now erecting and equipping a power house. J. C. Barnsdale, 618 Tower Avenue, is general manager.

The American Grinder Mfg. Company, 2203 Sycamore Street, Milwaukee, has increased its capital stock from $25,000 to $100,000 to cover the larger demands for working capital resulting from rapid growth of its business. L. E. Barteno is secretary.

The Line Drive Tractor Company, organized recently in South Dakota with an authorized capital stock of $1,000,000, with Milwaukee capital holding the principal interest, will establish works in South Milwaukee, Wis., immediately after Jan. 1. I. W. Davis, superintendent of the Stowell Company, South Milwaukee, will be works manager. David E. Ross, of the Ross Tool & Gear Company, Lafayette, Ind., is to be chief consulting engineer. The initial annual production will be 1200 machines.

It is reported from Port Washington, Wis., that John Gilson, Jr., until recently holding a large interest in the Gilson Mfg. Company of that city, has purchased the South Side Foundry and will take possession Jan. 1.

The Vollrath Company, Sheboygan, Wis., maker of enameled ware and sanitary goods, has started work on razing its old foundry and the original enameling shop, to make room for important additions and extensions to be erected early next spring.

The A. Z. Metal Works, Thiensville, Wis., specializing in automobile and tractor radiators, lost its entire plant by fire. It is probable that a new factory will be erected.

The E. H. Karrer Company, 278 West Water Street, Milwaukee, manufacturing surgical supplies and instruments, will build a four-story fireproof factory and warehouse, 20 x 127 ft., at 246 West Water Street. Plans will be prepared about Jan. 1.

Frank Hamacheck, Kewaunee, Wis., manufacturing farm machinery and cannery harvesting tools and equipment, has completed work on a new assembling building, 71 x 121 ft., of solid brick, and will increase his output.

The Richards Company, 217 West Water Street, Milwaukee, lumber manufacturer, has increased its capital stock from $25,000 to $170,000 in preparation for extension of operations. Arthur L. Richards is president.

H. J. Chesick, South Milwaukee, Wis., is negotiating for

the purchase of the property of the Vesper Foundry & Machine Company, Vesper, Wis., which has been idle for some time. Mr. Chesick is trying to interest local capital to take a small interest as a condition of purchase.

The Central South

LOUISVILLE, KY., Dec., 11, 1916.

Although there has been a marked increase in the car supply for the last three weeks, recurrence of the shortage is an ever-present apprehension with carriers and shippers in this section, and some disposition is found to curtail business accordingly. Coal operators are inclined to believe that January will see higher prices than have as yet been reached. Numerous fires are responsible for inquiries as to replacements for power and special machinery. Capacity operations continue the rule in the manufacturing plants of Louisville and orders insure continued good business. The farm implement companies, it is predicted, will shortly announce advances in price.

The Bader-Vonderhite Company, Louisville, will be incorporated by George D. Bader and others to establish an electric garage. A site has been purchased and a plant to cost $48,000 will be erected, General Electric equipment to be installed.

W. H. G. Herses, Louisville, Ky., and Charles Walls, Lebanon, Ky., have purchased the plant of the Campbellsville Public Utilities Company, Campbellsville, Ky., and will install one 100-hp. engine and one 25-hp. engine.

The Hull Pump & Tank Company, Owensboro, Ky., has increased its capital from $100,000 to $200,000. J. W. McCulloch is president.

Armour & Co., Knoxville, Tenn., will remodel their plant at Knoxville and install refrigerating machinery at a cost of $9,000.

The Chattanooga Buggy & Auto Company, Chattanooga, Tenn., has been incorporated with capital stock of $3,500 by W. R. Beise, C. W. Beise, and others.

It is reported in Knoxville, Tenn., that the Southern Railway proposes extensive trackage, terminal, and possibly shop construction, in connection with acquisition by the company of 600 acres contiguous to its tracks east of the city.

The John G. Duncan Company, Knoxville, Tenn., is asking for prices on a new or second-hand squirrel-cage, three-phase, 60-cycle, 220-volt induction motor of 900 r.p.m.; a 125-hp. unit preferred, but can use one up to 150-hp.

The Illinois Central Railroad will build machine shops at Louisville, Ky., to cost $18,000.

St. Louis

ST. LOUIS, MO., Dec. 11, 1916.

No decrease is apparent in the demand for machine tools. Deliveries continue the chief problem for consideration. Dealers have little or no difficulty in placing all equipment available, either for present or future delivery. A notable incident of the week was an auction sale of a large quantity of second-hand wood-working machinery of the best type, comprising the equipment of a big plant. It was disposed of at especially gratifying prices, in most cases approximating the original cost and in some cases at greater than cost. Threatened increases in second-hand machinery supplies have had no apparent effect upon the market. Plants are working up to capacity and are in need of equipment for replacement.

The Williams Boltless Rail Joint Company, incorporated in Arizona, will establish headquarters in St. Louis and utilize $50,000 of its capital in a plant.

An oil refinery to cost $1,000,000 equipped, is to be built at St. Louis, Mo., by the Roxana Petroleum Company, subsidiary of the Royal Dutch Shell Company, and a 10-in. pipe line with necessary pumping equipment will be built from Cushing, Okla., to St. Louis.

The North American Oil & Refining Corporation, Kansas City, Mo., will equip an oil refinery near Sheffield, Mo., at an initfal cost of about $100,000, and will then gradually triple the initial capacity.

Joplin, Mo., will expend about $175,000 to the equipment of an ice-making and an electrical power plant for the city.

R. M. Pearson, Little Rock, Ark., will erect a garage and machine shop, 50 x 140 ft. About $10,000 of machinery will be required.

The Williams Rotary Ditching Machine Company, Jonesboro, Ark., will have its devices manufactured under contract for the present. In the meantime it will proceed with the establishment of its proposed plant, estimated to cost $100,000.

The Pierce Oil Company, St. Louis, Mo., will equip a pipe line with pumping stations, etc., from the Healdton, Okla., district to Fort Worth, Tex. About 25,000 bbl. daily capacity is contemplated.

The Oklahoma Cotton Cleaner Company, Durant, Okla., has been incorporated with a capital stock of $20,000 by L. E. Lee, J. R. McKinney and W. F. Pendleton to manufacture cotton-cleaning apparatus.

The Solar Oil Heating Company, Muskogee, Okla., has been incorporated with a capital stock of $10,000 by John M. Coe, C. R. Teter and M. G. Young to manufacture heaters.

The Clinton & Oklahoma Western Railway, Clinton, Okla., W. S. Haid, general manager, will reconstruct its shops at Clinton, burned in November.

The Southwestern Power, Light & Railway Company, 466 Security Building, Oklahoma City, Okla., will expend about $1,000,000 on a series of hydro-electric plants on the Washita River; about five are proposed with a total capacity of 75,000 hp. The ultimate investment will be about $3,000,000.

The United Iron Works, Okmulgee, Okla., will erect two additions to its plant, to be used for a machine shop and a boiler shop, at an approximate cost of $35,000.

W. H. Wilson, mayor, Independence, La., will receive bids on waterworks plant equipment. Crude oil engines, pumps, etc., are wanted.

E. L. Knight, Bogalusa, La., will equip a garage and machine shop to cost about $15,000.

Doullant & Williams, New Orleans, La., will add to its shipyard facilities, including a dry dock, with pumps, etc.

The Standard Gas Generator Company, New Orleans, La., will equip a plant. Louis A. Murphy is the engineer in charge.

The Richardson Aeroplane Corporation, New Orleans, La., recently organized with a capital of $500,000, will build a large plant in that city.

Birmingham

BIRMINGHAM, ALA., Dec. 11, 1916.

While the machinery business remains active there is more or less complaint of increasing inability of buyers to meet the rising prices. Various structural enterprises are being deferred for this reason. Inability to secure machine tools with any degree of promptness is also hindering construction. The Alabama graphite field continues to take a large amount of hydroelectric apparatus, the rapid development there partaking of the character of a gold fields rush.

The Semet-Solvay Company, Birmingham and Syracuse, N. Y.,-will spend $250,000 opening coal mines in Tuscaloosa County, Ala.

The American Box Company, Cleveland, Ohio, will build a box and shook plant at McDowell, Ala., investing about $50,000.

The American Pine & Cypress Company, Leland, Ohio, will establish a sawmill for pine and cypress lumber at Jacksonville, Fla.; daily capacity of 25,000 ft.

The Gress Mfg. Company, 13 Broadway, New York, will rebuild its lumber mill at Jacksonville, Fla., recently destroyed by fire with a loss estimated at $100,000.

The Montgomery Lumber & Mfg. Company, Montgomery, Ala., has purchased a large tract of timber and will manufacture pine and hardwood lumber.

Texas

AUSTIN, TEX., Dec. 9, 1916.

R. F. Godwin has purchased the plant of the Wellington Light & Power Company at Wellington. Improvements will be made.

The Texas Power & Light Company, Dallas, which some time ago entered into a contract with the city of Denison, involving the construction of an electric power plant near by on the Red River, will apply for a three-year extension of its contract. The proposed plant is to cost about $600,000.

The City Council, Shiner, will install a crude oil engine, dynamo and other equipment in the municipal electric light plant.

The Pierce-Fordyce Oil Association plans to build an 8-in. oil pipe line from the Healdton field in Oklahoma to its refinery at Fort Worth at a cost of approximately $1,000,000.

The Texas Brewing Company, Fort Worth, has plans for building an ice plant to be equipped with crushers, hoisting machines and conveyors sufficient to ice twelve refrigerating cars at one time.

San Francisco

SAN FRANCISCO, CAL., Dec. 5, 1916.

The machinery market continues quite active. Except for small lathes, machine tool deliveries are about as slow as ever, and the car situation causes further delay. While merchants are getting good-sized deliveries on old orders, most of the tools are spoken for and it is impossible to build up any stock. Buying is principally in small lots, though a few important inquiries are coming out. In miscellaneous lines, sugar mill equipment is of considerable importance. Mining and smelting companies continue to buy freely. Considerable expansion is contemplated by lumber interests, but the car shortage retards business. Irrigation and reclamation projects are producing considerable business and electrical equipment is moving well. Development in the oil fields is exceptionally active.

Bradley, Bruff & Labarthe, San Francisco, engineers, are taking figures on a list of tools for two shops of the Arizona-Hercules Copper Company, which includes large lathes, planing, shaping and milling machines, drill presses, two 1100-lb. steam hammers, etc.

Henry A. Hyde, 143 Second Street, agent for several Eastern lines of gas engines, is retiring, turning over the business to W. A. Eckberg.

The Fontana Power Company, Colton, Cal., has plans for a hydroelectric plant of 1800 kw. capacity.

The Southern Pacific Railroad has completed plans for shops and yards to be built in Visitacion Valley, at the south end of San Francisco.

H. W. Leach has had plans drawn for a machine shop at Broadway and Piedmont Avenue, Oakland.

The Santa Fé car shops and depot, at San Bernardino, Cal., were destroyed by fire Nov. 16 with an estimated loss of $225,000. The company has purchased additional land and will rebuild on a larger scale, adding a shop to handle refrigerator car repairs for its Pacific territory.

The Warman Steel Casting Company has had plans drawn for a plant at Los Angeles.

The Baker Iron Works, Los Angeles, will erect a machine shop at 927 North Broadway.

The Southern Pacific car shops at Sacramento, Cal., suffered a fire loss of about $50,000 Nov. 27.

The Pacific Northwest

SEATTLE, WASH., Dec. 5, 1916.

Unless the present car supply is increased, it is probable that the lumber and shingle mills will be unable to continue operating until the usual Christmas shutdown. With two or three exceptions, every line of manufacturing business in Washington and Oregon has shown a substantial improvement in the past three months. Even the formidable car shortage has not been able to offset the optimism prevailing over the great bulk of trade which it does not directly affect. Manufacturers state that they are swamped with orders. Demand for mining equipment is unusually active. Many lumber plants are now under construction. This work calls for considerable mill equipment, including a fair amount of second-hand machinery.

The plant of the Washington Overseas Shipbuilding Construction Company, Aberdeen, Wash., is nearing completion, and will lay the keel for the first vessel about Dec. 20. The company's headquarters are in Seattle, and it is stated that about $400,000 will be expended in rigging and outfitting the seven auxiliary-powered schooners which it has contracted to build. P. J. Donahoe is superintendent.

A dry sulphide paper pulp mill of 60 tons daily capacity will be constructed in Port Angeles, Wash., by Whalen Brothers, Vancouver, B. C. It will be the initial unit of a larger paper-making business to be established there. The company also plans the erection of a sawmill with 100,000 ft. daily capacity, to prepare timber for the pulp mill.

The Todd Shipbuilding & Dry Dock Corporation of New York, which controls the Seattle Construction & Dry Dock Company, has announced through Tacoma stockholders that a shipbuilding plant will be erected in Tacoma immediately, according to Chester Thorne, a Tacoma banker. The company has purchased 100 acres of land on the tideflats.

The plant of the Power-Wilson Company, Conrad, Mont., implement manufacturer, was destroyed by fire recently with a loss estimated at $80,000. Plans are under way for rebuilding on an enlarged scale.

The Albina Engine & Machine Works, Portland, announces that its proposed shipbuilding plant will include five ways instead of two as previously planned. Increased facilities are required by the closing of contracts for four 3800-ton steel steamers. The machine shop of the plant will be 500 ft. long.

The Libby Water Works, Electric Light & Power Company, Libby, Mont., plans to install an auxiliary power plant, operated by a crude oil engine, at a cost of $10,000.

The American Nitrogen Products Company, Securities Building, Seattle, has started preliminary work on construction of the first unit of a nitrate plant at La Grande, Wash., which will cost $500,000. C. F. Graff is president and general manager, and E. L. Blaine is secretary. The company has recently closed contract with the city of Tacoma to supply it electrical energy. The company had filed on a power site on the Sauk-Suiattle River, near Everett, Wash., but this site is held by the Seattle municipal power plant. The proposed plant will extract nitrates from the air and is to be completed within a year, although a portion will be operated in a few months.

The Pacific American Fisheries, Bellingham, Wash., plan the construction of two additional sea-going freighters, the keels to be laid shortly after Jan. 1. The company also plans the construction of a new three-line cannery at False Pass, Alaska, to cost $150,000.

The Erickson Shipbuilding Company, Seattle, Wash., has been organized with C. J. Erickson, president, and E. L. Grondahl, secretary. It will establish a cannery in Alaska, and will construct its own ships for service in Alaska.

The New Bay Park Lumber Company, North Bend, Ore., announces that it will immediately begin the construction of a shipbuilding plant in that city. It will have three ship ways.

Machinery valued at $65,000, en route to the Montana Power Company, Great Falls, where machinery to give 10,000 additional kw. is to be installed, was damaged by fire in the yards of the Butte, Anaconda & Pacific Railway in Butte recently. The power company, it is reported, will order new equipment.

The Ever Ready Indoor Clothes Drier Company, Seattle, has been organized for $15,000 by E. C. Woodworth, D. J. Conners and D. H. Payne and it is stated will establish a plant for the manufacture of a patented device.

The Seattle Construction & Dry Dock Company, Seattle, will immediately add to its machinery equipment and erect several buildings to provide facilities for work on the contract for building one of the four 35-knot light cruisers authorized by Congress.

Owing to congestion in Eastern mills, the Portland Rubber Mills, Portland, Ore., has been asked to bid on an order for 3,000,000 small rubber washers. The company reports its business three times that of a year ago, and the plant is running double shift to supply demand.

Canada

TORONTO, Dec. 9, 1916.

Very active conditions prevail in metal manufacturing industries throughout Canada. Manufacturers of locomotives, cars, farm implements, automobiles, machinery, etc., have been exceptionally busy the past month and prospects are bright for the coming year. The Imperial Munitions Board is still placing large orders for the manufacture of munitions. It is reported that since the outbreak of war in 1914 the board and the War Purchasing Commission in Canada have placed orders for upward of one billion dollars. The shops and foundries on the Pacific coast expect to be kept busy for the next six months turning out shells at the rate of 30,000 per week. It is announced that a number of plants will find it necessary to install additional machinery in order to make the shells. The scarcity of labor is a decided drawback in most lines of manufacture.

The shipbuilding industry is showing greater activity than ever. The insistent demand from neutral countries for ships to replace the vessels being destroyed by the war has revived interest in the Amalgamated Engineering & Drydock Company, which a few months previous to the outbreak of war had plans completed for the construction of the largest drydock, shipbuilding and engineering plant on the Pacific coast at Burrard Inlet. J. C. V. Spratt of the Victoria Machinery Depot, Victoria, B. C., was at the head of the undertaking. It is stated that the company is now going ahead and has placed contracts in the United States for the erection of the plant, which will cost approximately $5,500,000.

The Canada Steamships, Ltd., has taken over the plant and property of the Collingwood Shipbuilding Company, Collingwood, Ont. The syndicate taking over the shipyards will create a new corporation to have a capital stock of $2,000,000. The formal transfer will take place Jan. 2 and includes the yards and plant at Collingwood, also the Collingwood Shipbuilding Company's interest in the shipyard at Kingston, Ont.

The Bryant Paper Company, Kalamazoo, Mich., and the Oxford Paper Company, Rumford Falls, Me., have purchased the Edward Partington Pulp & Paper Company, St. John, N. B.

for $3,000,000. A total of 372,000 acres of land is involved. A new company has been organized as the Nashwaak Pulp & Paper Company, and offices will be maintained in New York City. Improvements to cost $250,000 will be made.

The Nova Scotia Steel & Coal Company, New Glasgow, N. S., has commenced the erection of a steel foundry which will obviate the necessity of ordering steel castings from the United States for use in its car shops.

The new Grand Trunk shops at Port Huron, which are to replace the old shops destroyed by fire some time ago, will cost about $1,000,000. They will be used principally for the repair of freight and passenger cars and will consist of a power house containing six 150-hp. boilers serving double steam generating units of 300 kw., a passenger car shop of two units, 135 x 545 ft.; a freight car shop, 160 x 360 ft.; a cabinet shop, 73 x 250 ft.; a blacksmith and machine shop, 150 x 300 ft.; a wood mill, 90 x 210 ft., etc. All equipment will be motor-driven.

The M. Brennan & Sons Mfg. Company, Hamilton, is in the market for a 13-hp. steam engine.

The Hydro Electric Power Commission, University Avenue, Toronto, proposes to construct a plant at Port Arthur, Ont., for the development of about 30,000 hp., at a cost of several million dollars.

The plant owned by J. H. Connor, Pretoria Avenue, Ottawa, manufacturer of washing machines, etc., was destroyed by fire with a loss of $25,000. It will be rebuilt.

Plans for rebuilding the cold storage plant of Flavelles, Ltd., at Lindsay, Ont., are being prepared by the Madison Cooper Company, New York City. It will cost $75,000.

The Mueller Mfg. Company, Sarnia, Ont., is making arrangements to double the capacity of its brass plant.

The Adams Brothers Harness Mfg. Company, Ltd., McDermot Avenue East, Winnipeg, has secured a site at Saskatoon, Sask., and will build a factory in the spring to cost $125,000.

Sheldons, Ltd., Galt, Ont., manufacturer of light sheet steel, steam specialties, fans, etc., has awarded a contract for an addition to cost $18,000.

Work has commenced on the erection of a temporary plant for the Hamilton Steel Wheel Company, Hamilton, to cost $8,000.

The Canadian Shovel & Tool Company, Imperial Street, Hamilton, has commenced the erection of an addition to cost $4,000.

The Shaaks Machine Works and the Vulcan Iron Works, at present located in New Westminster, B. C., propose to move their plants to Vancouver, B. C. Additions will be made to both plants to double the output.

The Vancouver Drydocks, Ltd., Vancouver, B. C., has completed arrangements for the erection of a 16,000-ton double-section floating drydock capable of handling boats up to 18,000 tons. A repair and shipbuilding plant will also be constructed. The project will cost $2,000,000. Charles Meek, Vancouver, B. C., is active in the enterprise.

The Canadian Aeroplanes, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Reginald H. Parmenter, 93 Dunvegan Road; Arthur J. Thomson, William S. Morlock, and others, to manufacture aeroplanes, etc.

S. Fremes & Co., Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Oscar H. King, 15 Wellington Street East; William Cherry, Samuel King, and others, to manufacture clocks, watches, jewelry, etc.

The Provist Mfg. Company, Ltd., Edmonton, Alberta, has been incorporated with a capital stock of $50,000 by Oscar T. Ross, George H. Stoddart, Ludger Trudel, and others, to manufacture automobile and stump pullers, trucks, etc.

The International Mfg. Company, Ltd., Ottawa, has been incorporated with a capital stock of $1,000,000 by John A. Harriss, Rufus L. Patterson and Alfred O. Hoyt, all of New York City; Wilfred J. Hawkins, Montclair, N. J., and others, and is a subsidiary of the International Arms & Fuse Company of America, New York. The company has secured a site on the north side of Notre Dame Street, just west of Dominion Park, Montreal, and work has begun on the erection of a plant 250 x 750 ft. The new plant will cost $1,000,000 and will manufacture time fuses, explosives, shells, cartridges, etc.

The Canada Truck Company, Ltd., Montreal, has been incorporated with a capital stock of $49,000 by Richard E. Hannan, John W. Blair, and Francis J. Laverty, all of Westmount, Que.; Charles A. Hale, Montreal, and others, to manufacture motor trucks, etc.

The Bissell Carpet Sweeper Company of Canada, Ltd., Niagara Falls, Ont., has been incorporated with a capital stock of $100,000 by William B. Sturrup, Thomas S. H. Giles, 6 Adelaide Street East; John S. Duggan, and others, to manufacture vacuum and carpet sweepers, etc.

The Canadian Desmond-Stephen Mfg. Company, Ltd., Hamilton, has been incorporated with a capital stock of $50,000 by Archibald H. Gibson, Gabriel H. Levy, Charles H. Higgins, and others, to manufacture automatic steam injectors and ejectors, abrasive wheels, grinding machinery machine tools, etc.

Government Purchases

WASHINGTON, D. C., Dec. 11, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 492, for one 24-in. bench drilling machine, one double emery grinding machine and one screw cutting engine lathe, all for Norfolk; one column shaping machine, one double emery grinding machine and one screw cutting engine lathe, all for Boston; schedule 494, for one die sinking machine; schedule 501, for one electric overhead crane, and schedule 502, for one hobbing machine, all for Boston.

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until 11 a. m., Dec. 26, for furnishing one 80-ton bridge crane, three 15-ton bridge cranes, twelve 5-ton wall cranes, and eight 3-ton wall cranes, more or less, for each of the new structural shops at the Norfolk and the Philadelphia navy yards; until 11 a. m., Dec. 18, for furnishing two fitting-out cranes for Mare Island. The time for opening proposals for two fitting-out cranes for Mare Island, under specification 2293, is extended to 11 a. m., Dec. 18.

The U. S. engineer office, Pittsburgh, will receive sealed proposals for furnishing two air compressors and one water turbine complete with gear drive until noon, Dec. 29.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until Dec. 18, under proposal 2093, for furnishing pneumatic hoists, etc.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Dec. 5, for supplies for the naval service as follows:

Schedule 362, Ordnance

Class 111, Washington—One universal milling machine—Bid 20, $2,709; 51, $2,355; 73, $2,465; 152, $300.

Class 112, Washington—One surface grinding machine—Bid 20, $560; 51, $492; 73, $484.

Schedule 363, Construction and Repair

Class 121, Norfolk—One oxy-acetylene machine—Bid 36, $2,500.

Class 122, Norfolk—Two punch press and riveting machines—Bid 44, $375; 94, $805; 102, $868.

Schedule 364, Steam Engineering

Class 131, Charleston—Two turbo-generating sets with spares—Bid 140, $5,242.50; 151, $5,917.45.

Schedule 365, Steam Engineering

Class 132, Boston—One turret lathe complete with tools and electrical equipment—Bid 52, $4,990; 124, $5,166.

Schedule 376, Ordnance

Class 192, Washington—One steam locomotive crane—Bid 67, $14,420 and $14,570; 87, $15,547.

Schedule 377, Ordnance

Class 193, Washington—Two 5-ft. radial drilling machines—Bid 1, $3,037; 73, $3,340; 94, $3,270; 101, $1,966.

Class 194, Washington—One motor-driven heavy-duty drill press—Bid 73, $2,145, $2,345 and $2,395.

Schedule 378, Ordnance

Class 195, Newport—Two turbine bucket cutting machines—No bids.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 1, Aumen Machinery Company; 20, Brown & Sharpe Mfg. Company; 36, Davis-Bournonville Company; 44, Excelsior Tool & Machine Company; 51, Fairbanks Company; 52, Gisholt Machine Company; 67, Industrial Works; 73, Kemp Machinery Company; 87, Link Belt Company; 94, Manning, Maxwell & Moore, Inc.; 101, Niles-Bement-Pond Company; 102, D. Nast Machinery Company; 124, Sherritt & Stoer Company; 140, Terry Steam Turbine Company; 151, Westinghouse Electric & Mfg. Company; 152, Ward & Co.

The Aluminum Goods Mfg. Company, with general offices at Manitowoc, Wis., has covered the lives of all employees in its plants at Manitowoc and Two Rivers, Wis., and Newark, N. J., with an insurance policy of $1,000 each, under the group insurance plan. The insurance is taken out in the Aetna Life without any expense to employees.

Ten new boilers will be installed by the Lalance & Grosjean Mfg. Company in its tin-plate mills at Harrisburg, Pa., and the plant will be closed this month. The mills will resume operation about Jan. 1.

NEW TRADE PUBLICATIONS

Gasoline Pump and Measuring Tank.—Star Specialty Company, York, Pa. Circular. Deals with a gasoline pump and measuring tank which is graduated from 1 to 5 gal. Provision is made for varying the amount of gasoline pumped into the measuring tank by an indicator on the side of the pump. Any excess gasoline pumped flows back into the underground storage tank while the liquid in the measuring tank is delivered to the car by gravity, which eliminates any chance for gasoline to remain either in the measuring tank or the delivery hose.

Flexible Shafting.—Stow Mfg. Company, Binghamton, N. Y. Miniature bulletin No. 102. Treats of a line of flexible shafting and the various tools supplied for use with it. The bulletin is a reduced edition of the company's standard one and measures 3¼ x 4⅞ in. Its small size is designed to make it readily available for reference purposes, as it can be kept in a convenient place, which might not be the case with the larger bulletin.

Engineering Construction.—Westinghouse Church Kerr & Co., 37 Wall Street, New York City. Folder. Contains a brief announcement of the work which the company has done in the harbor at New Haven, Conn., for the Winchester Repeating Arms Company. Emphasis is laid upon the fact that since the original contract was signed five years ago more than 60 different assignments, varying from the design and construction of brass rolling mills, foundries and machine shops to the making of engineering reports, have been received from this company.

Portable Electric Tools.—Black & Decker Mfg. Company, Baltimore, Md. Two folders. The first refers to a line of portable electric drilling machines designed for close corner work and equipped with a pistol grip and trigger switch control. Emphasis is placed on the features of elimination of drill breakage, ease of handling, light weight and strength of construction. A list of the six different sizes, which have a maximum capacity of a ⅝-in. hole in steel, is given, together with a view of the machine in use. The other folder gives general description and specifications for a motor-driven air pump for supplying air in garages, tire salesrooms, repair shops, filling stations, etc. Views of the device, which is made in either portable, wall, or carriage types, are included.

Portable Electric Hoists and Air Hose and Fittings.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Two bulletins. The first, E-45, superseding E-40, lists a line of portable electric hoists for use on direct-current circuits. A description of the hoist is presented, supplemented by a halftone engraving and a sectional view of the hoist. A table of the sizes, weights and dimensions and a view of the hoist in use are included. The other bulletin, No. 129, calls attention to a line of hose, hose couplings and hose clamp tools for use with compressed air. The various forms of couplings are illustrated, together with portions of the hose showing the trademarks of the three grades made. Tables of the sizes in which the different kinds of hose can be supplied are included, together with brief illustrated descriptions of the clamping tools employed.

Cork Insulation.—Armstrong Cork & Insulation Company, Pittsburgh, Pa. Two pamphlets. The first illustrates a line of corkboard insulation for cold storage warehouses, ice plants, creameries, freezing tanks, refrigerators, etc. The importance of proper insulation is discussed, followed by statements of the advantages of the company's Nonpareil insulation, the text being supplemented by a number of engravings. The other pamphlet pertains to the record made by this insulation in covering brine lines, which was removed after 15 years' service and found to be in good condition. An illustration of a section of the covering is included.

Hand Traveling Cranes and Trolleys.—Victor R. Browning & Co., 17,701 Lake Shore Boulevard, Cleveland, Ohio. Bulletin. Calls attention to a line of single I-beam hand traveling cranes and push and geared trolleys. Engravings of the trolleys are presented with condensed specification tables, and a table giving the size of beam required for different sizes and spans of the hand traveling cranes is included. Mention is made of other products of the company, which include cranes of all types, monorail systems, revolving shovels, lifting magnets, clamshell buckets, etc.

Chain Screen Doors for Furnaces.—E. J. Codd Company, 700 South Caroline Street, Baltimore, Md. Pamphlet. Describes and illustrates a chain screen door for furnaces and ovens, which was illustrated in THE IRON AGE, Sept. 28, 1916. The doors, which are designed for use on glass, steel, copper and chemical furnaces, consist of a number of freely hanging individual strands of steel chain suspended close together from a steel bar. This arrangement keeps the heat, glare, gases and sparks from leaving the furnace and the cold air from entering, while the strands of chain are readily parted by the tools or other objects inserted in the furnace. In addition to this type of door, another is made in which the ends of the chains terminate in a series of light steel tubes, designed to prevent the chain from catching in the crotch of the tongs used for handling the furnace or oven charge. A number of views of the screen in use are included.

Automatic Screw Machines.—Cincinnati Automatic Machine Company, Oakley, Cincinnati, Ohio. Catalog. Devoted to a five-spindle type of automatic screw machine for turning any length of round, hexagon or square stock up to 3 in. In the description a separate paragraph is devoted to each feature and a side-head in full face contrasting type indicates the subject covered. The various features are listed on a separate page and a table of the principal dimensions and specifications is given. The text is supplemented by a number of engravings of the machine, the tools employed and some of the work that has been turned out by it. A drawing of the single-belt drive arrangement is included.

Expansion Joint.—Ross Heater & Mfg. Company, Inc., 753 Bird Avenue, Buffalo, N. Y. Booklet. Illustrates and describes a cross-head guided type of expansion joint which was illustrated in THE IRON AGE, May 4, 1916. The special features of the joint, such as long traverse of free movement, prevention of sagging of the line and strain upon the sliding sleeve and sensitiveness to variation in the length of the pipe line, are briefly touched upon. A number of views of the joint and several typical applications of it are included. Instructions for calculating the number of expansion joints required in a piping system are given, and mention is made of a multi-head feed water heater.

Power Hammers.—Beaudry & Co., Inc., 141 Milk Street, Boston, Mass. Booklet. Points out the advantages of the company's two types of power hammers for light and heavy railroad, machine and general blacksmithing; swaging, collaring, drawing, plating, spindle making and general manufacturing, which are elasticity, control and the force of the blow. The device used to secure these results consists of two steel spring arms with hardened tool steel rollers operating within the ram upon a curved track. This device and several other parts of the hammer are illustrated and views of the complete hammer are presented. Specifications for both types of hammers, equipped for either belt or motor drive, are included.

Steel Plate Construction.—Treadwell Construction Company, Midland, Pa. Calendar hanger measuring 19 x 25 in. The dates for the months occupy about half of the leaves and are printed in heavy, easily read figures. The upper half of each leaf is given over to an illustration of some typical operation of the company, such as open-hearth steel ladles, coolers and scrubbers for a benzol plant, riveted steel pipe, oil agitators and stills, etc. A list of the various products is grouped around the engraving in each case.

Black and Special Sheets.—American Sheet & Tin Plate Company, Frick Building, Pittsburgh, Pa. Booklet No. 120. Relates to a line of black and special sheets that can be supplied either with or without a small percentage of copper. The various sheets covered include standard black Bessemer and open hearth, blue annealed, single pickled, automobile, stove and range, electrical, locker, furniture and office equipment sheets. In addition to describing the different sheets briefly, the trademarks of the several brands are reproduced in a number of cases. Mention is made of other specialties such as nickel plating, enameling, show card and tea tray stock; tack plate, cylinder lagging and locomotive jacket steel, etc. A bundling table of black sheets, giving the sizes, gages and weights is included, together with tables of the U. S. standard gage and thickness of steel sheets. A diagram of the manufacture of steel as used for sheet and tin-mill products is presented.

Hoisting Machine Accessories.—Clyde Iron Works, Duluth, Minn. Four circulars designed as supplements to catalog E. Illustrations and descriptive matter explain the use of the different accessories, which include an asbestos-lined friction ring, bucket-holding drums, an all-steel bull wheel and a group of banked levers to control the various operations of one or more engines by a single operator at a single point distant from the machines. Condensed specification tables are included in a number of cases.

The Wisconsin State Board of Industrial Education has fixed its requirements of State aid funds for continuation schools for the next two years at $212,000 a year, compared with $150,000 for the period now closing. The attendance in these schools has increased from 10,000 the first year of operation to 40,000 at present. State aid is given cities on the basis of two-thirds of the salaries of teachers and instructors.